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A Publication of the International Association of Milk, Food and Environmental Sanitarians, Inc.

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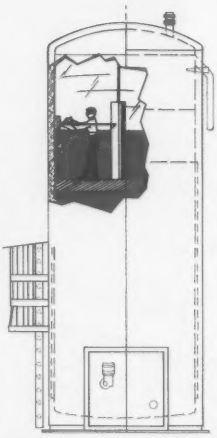

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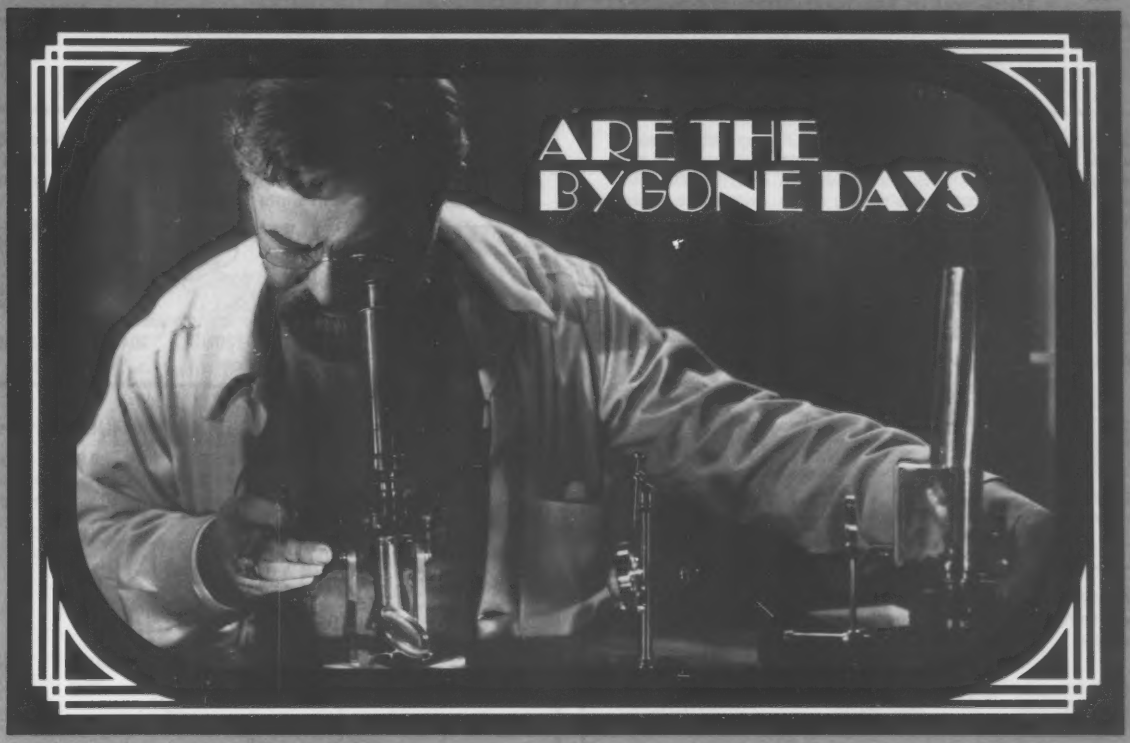


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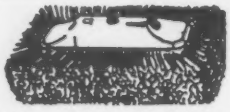
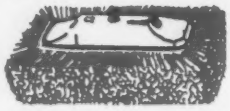
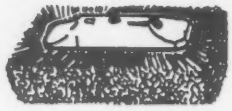


**20478 330NR Black Nylon**

**20479 330N White Nylon**



**20480 330ND Red Nylon**



**20481 330NB Blue Nylon**

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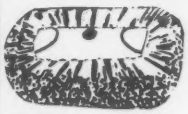
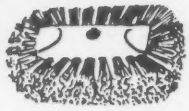


**20464 130NR White Nylon**

**20463 130ND Red Nylon**



**20462 130NB Blue Nylon**

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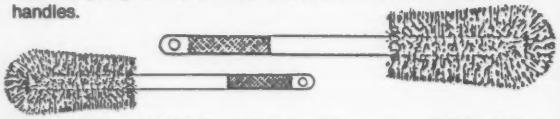
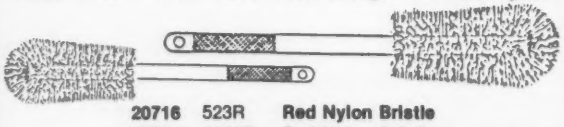
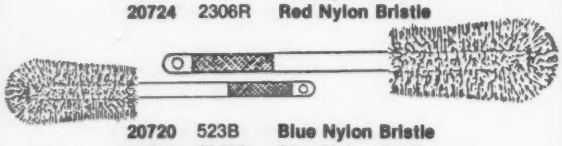


**20714 523** 2 3/4" dia., 12" Overall Length. **White Nylon**
**20726 2306** 3 1/4" dia., 15" Overall Length. **White Nylon**



**20716 523R Red Nylon Bristle**
**20724 2306R Red Nylon Bristle**



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**20728 2306B Blue Nylon Bristle**

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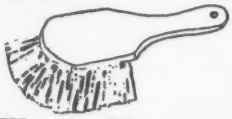

**20734 623 White Nylon**

**20730 623B Blue Nylon**

**20732 623R Red Nylon**

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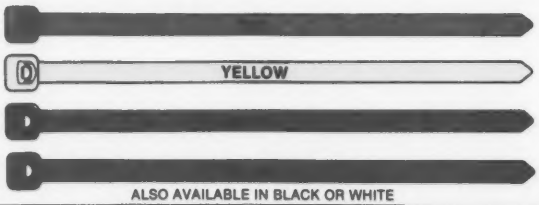


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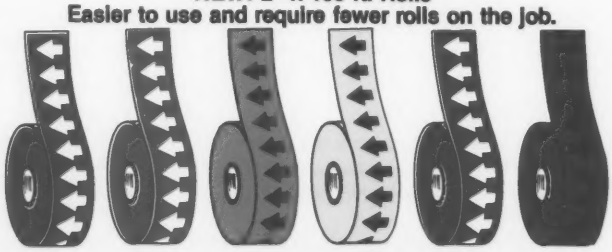

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# Dairy and Food Sanitation

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# Confined Spaces: Potential Problem For Sanitarians

by
**Homer C. Emery, Ph.D.***

Currently Lieutenant Colonel, United States Army Biomedical Engineering Research and Development Laboratory, Fort Detrick, Maryland.

Field sanitarians often make recommendations that will require workers to enter manholes, lift stations, digesters, storage vats, crawl spaces, or another type of confined space. In some cases sanitarians may be required to enter a confined space to conduct an inspection, collect samples, or evaluate sanitary conditions. Failure to recognize the potential hazards involved in entering a confined space and failure to recommend or take appropriate protective measures can result in serious problems.

In a recent alert issued by the National Institute for Occupational Safety and Health, sixteen deaths and fifty-three injuries were described that resulted from workers entering confined spaces without taking adequate precautions. NIOSH estimates that at least 174 confined space fatalities occur each year. The following cases from the NIOSH Alert are situations in which field sanitarians could become involved:

**Case History # One:**

A 54-year-old worker died inside a floating cover of a sewage digester while restarting a propane heater being used to warm the outside of the digester prior to painting. Someone had wired the safety valve open so that the flow of propane would be constant, even if the flame went out. When the worker attempted to light the heater, an explosion occurred. The injured worker crawled away from the heater into an area deficient in oxygen and died. A co-worker attempted a rescue without proper equipment and also died.

**Case History # Two:**

A 20-year-old construction worker died attempting to refuel a gasoline engine powered pump used to remove waste water from a 66 inch diameter sewer line that was under construction. The worker was overcome by carbon monoxide. A 28-year-old state inspector died in a rescue attempt. Both deaths were attributed to carbon monoxide.

**Case History # Three:**

A 21-year-old worker was repairing a drain line inside a waste water holding tank. The tank was four feet wide and eight feet deep. The worker collapsed and fell face down into six inches of water in the bottom of the tank. A second worker attempted rescue and also collapsed. The first worker was pronounced dead at the scene and the second worker died two weeks later. Both deaths were attributed to asphyxiation by methane gas.

**Case History # Four:**

A crew foreman was coating a valve on an underground waterline using an epoxy material containing 2-nitropropane and coal tar pitch. The valve was located in a service vault (12'x15'x15'). The foreman became ill and was hospitalized. Ten days later he lapsed into a coma and died. Cause of death was acute liver failure induced by inhalation of 2-nitropropane and coal tar pitch vapors.

**Case History # Five:**

A 27-year-old worker was attempting to repair a check valve located in an underground sewage pumping station. The check valve was under pressure because the work crew failed to ensure that the line had been isolated. When the workers removed the bolts from an inspection plate, that covered the check valve, the force of the waste water in the line blew the inspection plate off, injured workers, and allowed sewage to flood the underground pump station. The worker and three would-be rescuers died. Two deaths appeared to be due to drowning and two were attributed to asphyxiation from "sewer gas".

From analysis of these and other case histories NIOSH has found that 90% of all confined space fatalities occur as a result of one of the following causes: lack of oxygen; exposure to hydrogen sulfide, carbon monoxide, carbon dioxide; or explosions. Other potential hazards faced by workers entering confined spaces include: unexpected releases of hazardous energy, physical barriers or limitations to movement, and limited escape.

Before making entry into a confined space, supervisors should evaluate and test the atmosphere to determine if it is safe. Testing should be conducted using direct reading instruments with remote sampling probes. Testing of

manholes should be accomplished before the lid is removed. Moving the metal cover on a manhole could cause a spark resulting in an explosion if the atmosphere contains the right mixture of flammable or combustible gases.

Initial testing should be conducted to determine the oxygen level. If the oxygen level is less than 19.5%, the area should be considered as oxygen deficient. Other testing should be conducted to determine the possible presence of flammable gases, vapors, or solids and airborne concentrations of toxic materials.

If testing indicates the presence of toxic gases, respirators will be needed. Respirators used in confined spaces should be self-contained or air-supplied and of the positive pressure type. Workers that have not been trained in the use and wear of respirators should not be allowed to work in the area or be a member of standby rescue teams. Even if initial testing indicates the confined space is safe, mechanical ventilation may still need to be provided.

All workers involved should know established rescue procedures. A slight injury could become a major problem in a confined space. An established rescue plan that is known by all workers is a must. Careful review of the case histories presented show that many confined space emergencies occur as multiple fatalities. Normally, an unprepared and untrained worker will attempt rescue resulting in further injury or death.

Local health departments should insure that any sanitarian required to enter a confined space to inspect or collect samples has been trained and equipped to do so. In addition, health departments should alert supervisors of public work crews (water-sewage-solid waste) within their jurisdictions of confined space hazards. Training materials and other publications can be obtained from NIOSH, Division of Safety Research, 944 Chestnut Road, Morgantown, WV 26505. What would be a minor problem in other work areas could turn into a disaster within a confined space.

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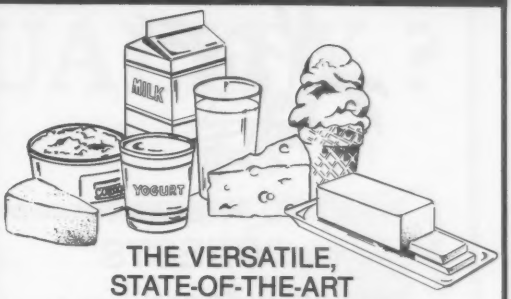


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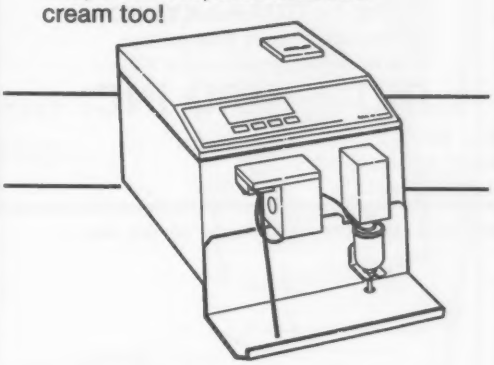

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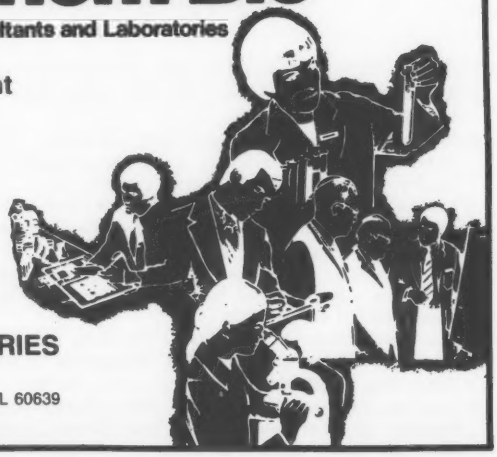

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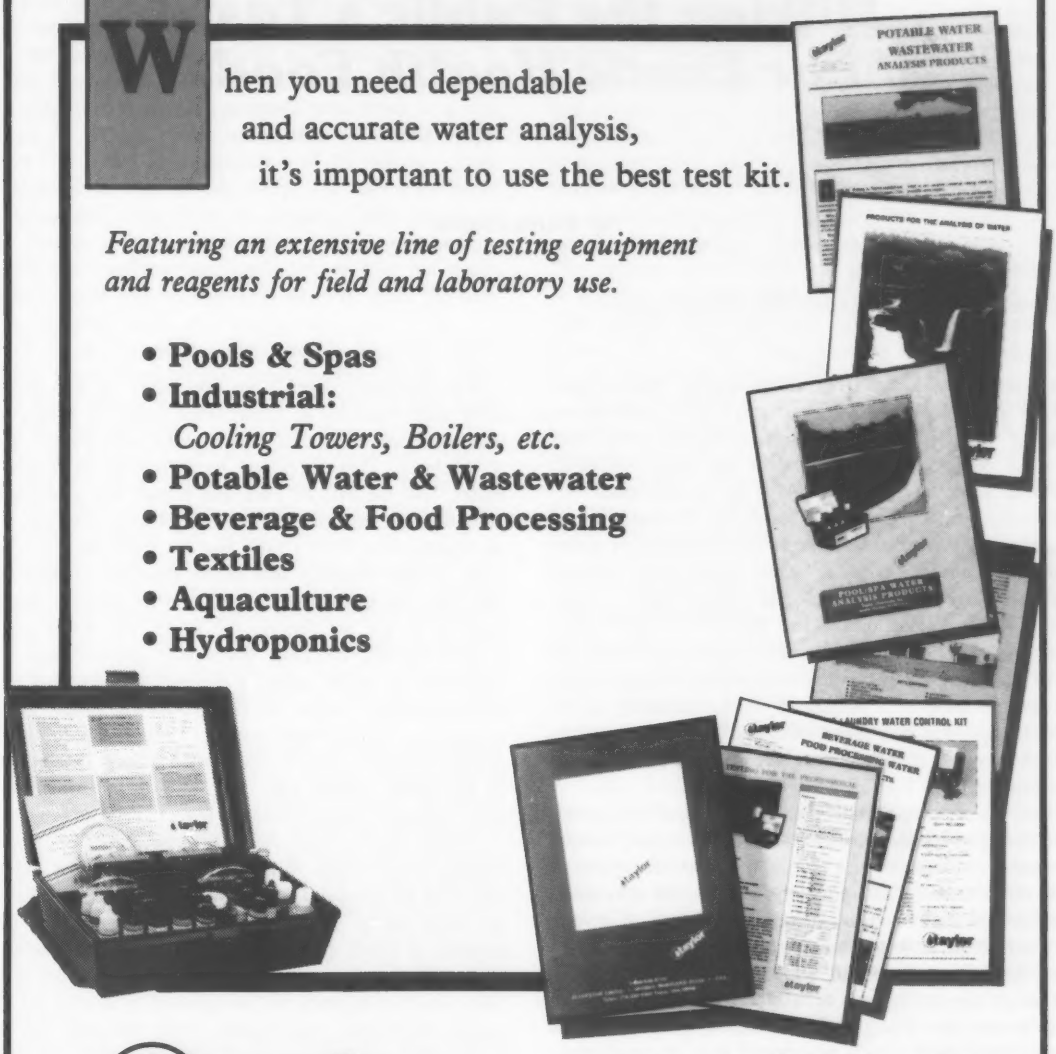


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# Beyond Yogurt: Milking the Public's Taste For Exotic Health Foods

**by Evelyn Zamula**

Reprinted From the November 1986/FDA Consumer

It's time to tell the truth about yogurt. Forget those old TV commercials showing yogurt-eating centenarians capering about like young Cossacks. Yogurt contributes no more or less to longevity than any other healthful, nutritious food, so why not enjoy it for its own sake?

And that's just what people are doing. Notice how the yogurt section in the supermarket has expanded in recent years? First there was plain yogurt. Then came flavored and fruit-filled yogurt, low-fat and nonfat yogurt, yogurt drinks, frozen yogurt, and so on. Instead of a few shelves in the dairy foods area, yards of yogurt now tempt the buyer. In 1955, the per capita consumption of yogurt was just over a tenth of a pound; in 1985, according to the U.S. Department of Agriculture, the average American stowed away an estimated four pounds, and consumption is still going up.

Now, riding the coattails of yogurt's popularity, come other fermented milk products, such as kefir, and various soy-based concoctions that resemble yogurt. These variations differ from yogurt not only in taste but also nutritionally. But they share with yogurt the knack of attracting the interest of American consumers looking for something exotic, new, healthful, and - most important - tasty.

Though yogurt has been around for thousands of years, most Americans didn't' know about it until fairly recently. And when it was introduced here it wasn't very popular. Yogurt was manufactured in some northeastern U.S. cities by Turkish and Armenian immigrants in the early 1900s, but serious commercial production didn't begin until 1940, when Dannon Carasso bought an existing yogurt factory in the Bronx and began making yogurt using a culture of bacteria brought from Europe. Yogurt found a ready market among certain ethnic groups in the New York City area, but didn't catch on with the rest of the country until the 1970s, when strawberry preserves were added, successfully masking the natural sour taste that some people disliked.

Who invented yogurt? No one really. It was undoubtedly discovered by accident, since yogurt is simply milk that has been converted into a weak solid by the action of bacteria. This happened more readily in warm climates, like the Middle East, but yogurt was also familiar centuries ago to those who lived in cold climates, such as Scandinavia. Given time and the right weather conditions, certain bacteria that occur naturally in milk from any mammal can cause milk to sour or ferment. Bacteria floating in the air can do the same, but either process is slow and unpredictable. Eventually, man learned a few shortcuts and either added a quantity of yesterday's bacteria-containing yogurt to fresh milk or stored milk in containers that had held yogurt. Though yogurt is made chiefly of cow's milk in the United States, in other parts of the world yogurt was - and still is - made from the milk of ewes, buffalo, camels, mares, yaks and goats.

Yogurt can be made from different forms of milk, including fresh whole milk, condensed milk, or partially skimmed or skimmed milk with or without added nonfat dry milk solids. American manufacturers usually use a mixture of fresh, partially skimmed milk and nonfat dry milk. Whether it turns into a liquid or the familiar custardy product depends on the amount of nonfat dry milk solids added and other factors. After the milk has been pasteurized and homogenized, it is innoculated with pure cultures of special strains of bacteria. The milk is incubated (at 105 to 115 degrees Fahrenheit) until the desired acidity and flavor is obtained and then chilled (at 45°F or lower) to halt further fermentation. The bacteria convert some of the milk sugar - lactose - into lactic acid, which gives yogurt its characteristic tangy taste and acts as a preservative. Flavorings, fruit, preserves, sweeteners and stabilizers may be added before or after incubation.

Currently, the main types of yogurt manufactured in this country are: unflavored; flavored, containing no fruit; and flavored, containing fruit (either sundae style, with

fruit at the bottom of the cup, or French or Swiss style, with fruit blended throughout the yogurt).

The two strains of bacteria used in making yogurt today are *Streptococcus thermophilus* and *Lactobacillus bulgaricus*. The latter strain was isolated by Dr. Elie Metchnikoff, a Russian bacteriologist and Nobel Prize winner. In the early 1900s, he published a treatise titled "The Prolongation of Life," in which he observed that people who lived around the Mediterranean basin, especially the Bulgarians, often lived to an advanced age. In fact, the Bulgarians could boast of 1,600 people per million (undoubtedly an exaggeration) who lived to a ripe old age of 100 or more, while only 46 American per million - or 3,504 in a population of 76 million - made it to that age in Metchnikoff's day. The doctor attributed the Bulgarians' long lives to yogurt - they ate about seven pounds a day - and he started eating yogurt himself. He was confident he would live to 150, but disappointed himself and his followers when he died, not halfway to his goal, at 71.

Aside from supposedly contributing to long life, which has not been scientifically substantiated, other health claims have been made for yogurt. Yogurt is said to be easier for some people to digest than milk. About 70 percent of the world's adults are lactose intolerant; that is, they find it difficult to digest large amount of lactose, and suffer from flatulence, cramps and diarrhea if they drink milk in more than small quantities at a time or without other food. The problem is that they do not produce enough of the enzyme lactase in the small intestine to digest the lactose. Lactase breaks down lactose, a complex sugar, into simple sugars (glucose and galactose) that can be absorbed through the digestive tract. (See "Sweet Milk and Sour Stomachs" in the March 1984 *FDA Consumer.)*

Lactose-intolerant individuals may, in fact, find yogurt more digestible than milk because lactase is produced in yogurt that contains active cultures (living bacteria). Some studies have suggested that the lactase produced by the bacteria can survive passage through the stomach to help in the digestion of lactose in the small intestine. This characteristic of yogurt may help to account for its popularity in Middle Eastern countries, where lactose intolerance is common. There is also evidence that when milk is fermented, the digestibility of the protein in milk is increased.

Another yogurt-is-good-for-you theory says that yogurt lowers blood cholesterol levels. Several studies using American subjects have noted reductions in cholesterol in those consuming over two quarts of yogurt daily, but no reduction in those consuming about two cups daily for 22 weeks. Animal studies have come up with similar results. Since it's unlikely that most people can eat enough yogurt daily to lower their cholesterol level significantly, it's hoped that further research will be able to identify the factor in yogurt - if indeed, there is one - with this cholesterol-lowering effect.

After long antibiotic therapy, patients are often advised by their doctors to eat yogurt to reestablish the beneficial bacteria normally found in the gut that the drugs may have destroyed. Conversely, yogurt is also given credit for inhibiting the growth in the intestine of bacteria that cause infections ,diarrhea and flatulence. Unfortunately, even such a presumably pro-yogurt group as the International Dairy Federation reports that there is no strong evidence that yogurt can do either.

But most Americans don't eat yogurt to reduce their cholesterol levels or fight an upset stomach. Many eat it because they believe it's low in calories. That may be true of plain low-fat and nonfat yogurts, but yogurts to which flavorings, sweeteners and fruits have been added have many more calories. According to the U.S. Department of Agriculture, the calories in an eight-ounce serving of fruited yogurt average about 230 (compared to 350 calories in a cooked, three-ounce hamburger and bun). The surprise is that there is an insignificant difference in calories between eight ounces of unflavored whole milk yogurt and unflavored nonfat yogurt - about 145 versus 125 - so the calorie-counting consumer who prefers the whole milk type needn't feel too guilty.

People also think yogurt is chock full of vitamins and minerals. For many nutrients that's true, although the amounts vary depending on the milk from which the yogurt is made. Generally, besides being rich in calcium, all types of yogurt are good sources of protein, phosphorus, potassium, riboflavin and niacin. Low-fat and nonfat varieties lose some of the fat-soluble vitamin A found in whole milk yogurts, while the addition of nonfat milk solids to any yogurt will increase the levels of calcium, protein, B vitamins and sodium. Naturally, the amount of cholesterol in whole milk yogurt is higher than that in the low-fat versions.

But the chief reason yogurt is such a big seller in supermarkets and health food stores is that people like it. Sales are increasing by 11 percent a year - with an estimated $1.3 billion market predicted for 1990. This has encouraged other manufacturers to introduce similar fermented milk products.

One of them is kefir - a cultured milk drink with a venerable past. Though popular in Europe for years, kefir has never found a large following here. One reason is that authentic kefir is made with yeasts in addition to bacterial cultures, giving it both a short shelf life and a mild kick, because fermentation can result in an alcohol content up to 1.5 percent. A type of kefir minus the yeasts is being marketed in this country and appeals to some because of its zestier taste.

A firm in New Jersey (The American Kefir Corp.) has recently launched a spoonable plain or fruited kefir called Basis Kefir - made from low-fat milk and added nonfat milk solids - in the New York metropolitan area. The company says its product is made with different strains of bacteria from yogurt, plus kefir yeasts smuggled out of a Leningrad plant - giving it, by association, that centenarian cachet again. The product is reputed to have fewer calories (115 in six ounces of fruited kefir com-

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# Securing the "Safety Net" In The Dairy Industry

by

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**Purdue University Cooperative Extension Service, Paper Number 160**

This paper was presented at the 1986 Indiana Dairy Industry Conference, Purdue University, March 19, 1986 which dealt with "Safety Net" Performance

Unfortunately illness of people who consumed dairy products have made headlines recently. Salmonella was found in 2% milk; Listeria, in Mexican cheese; Yersinia, in pasteurized milk, and Staphylococcus enterotoxins, in whipped butter (3, 4). What is happening to the safety performance of the dairy industry? What does this industry need to do, differently? What specific preventive measures are needed? This paper will address these questions and discuss those factors that could influence the "Safety Net" performance.

Conceptually, there are four layers to the "Safety Net": 1) the pasteurization process and its effectiveness, 2) the job performance of the production staff, 3) the active quality assurance programs, and 4) the adherence to the principles and practices that have influenced the laws and regulations governing the dairy industry.

### The Pasteurization Process

The most critical part of the "Safety Net" is the pasteurization process. The pasteurization process may be divided into two categories - 1) high temperature - short time (HTST) and 2) high heat short time (HHST). The HTST process involves time-temperature relationships which comply with those conditions defined in the Pasteurized Milk Ordinance and is adopted by the states for the Grade A regulations. The HHST process involves time-temperature relationship above the minimal HTST conditions and usually are in the 190°- 285°F range. However, unless the appropriate operating conditions are maintained for the equipment, product safety could be jeopardized. Hence, the health and food regulatory agencies require that pasteurization equipment be tested as outlined in the Pasteurized Milk Ordinance (1) which has been adopted by the dairy industry. Generally, these pasteurizer tests are carried out every 90 days with the exception of the "Continuous Flow Holders-Holding Time" test which is determined approximately every six months.

The 14 tests required for pasteurizer operation are the following (1):

TEST 1: *Indicating Thermometers - Temperature Accuracy.*

This test applied to all indicating thermometers used to monitor the temperature of the milk during pasteurization, including airspace thermometers. Acceptable accuracy is within 0.5°F for pasteurization thermometers and 1°F for airspace thermometers.

TEST 2: *Recording Thermometers - Temperature Accuracy.*

Any recording and recorder/controller thermometer used to record milk temperatures during pasteurization must be tested. Expected performance for this type thermometer should be within 1°F when compared to a certified reference thermometer.

TEST 3: *Recording Thermometer - Time Accuracy.*

Recorder response time and chart speed are examined with this test. The recorded time of pasteurization *must not exceed* the true elapsed time. Recorded time versus observed time is compared using an accurate timing device.

TEST 4: *Recording Thermometers - Check Against Indicating Thermometer.*

This test applies to all recording and recorder/controller thermometers used to record milk temperatures during pasteurization. The recording thermometer *must not read higher* than the corresponding indicating thermometer.

TEST 5: *Flow Diversion Device - Proper Assembly and Function.*

All flow diversion devices used with continuous flow pasteurizers must be tested. These devices must function correctly during normal pasteurizer operating conditions and shall *de-energize (shut down) the metering pump* when a malfunction or incorrect assembly of the device has occurred.

TEST 6: *Leak Protector Valve*.

This test requires an observation of leakage of milk past the valve seat while in the closed position. It is necessary to disconnect the piping from the valve outlet and observe for leakage when milk pressure is exerted against the upstream face of the valve. To pass this test, no leakage should be observed.

TEST 7: *Indicating Thermometers on Pipeline - Thermometric Response*.

Thermometric response of the indicating thermometer, used to monitor milk temperatures during pasteurization, requires this response to be within four seconds, over a 12°F thermometer scale under the specified testing conditions.

TEST 8: *Recorder/Controller - Thermometric Response*.

This testing procedure is applicable to all recorder/controllers used in connection with the continuous - flow pasteurizers except in HHST systems those which have the flow diversion device located at the end of the cooler section. This test requires the thermometric response to be within five seconds *at 12*°F below the cut-in temperature and the moment of cut-in by the controller, under the specified testing conditions.

TEST 9: *Setting of Control Switches - Regenerator Pressure*.

This test applies to all pressure switches controlling the operations of booster pumps on high heat - short-time pasteurizer systems employing regenerators. Expected performance of the pressure switch is *to not activate the pump operation* unless there is at least a one (1) pound greater pressure on the pasteurized milk side than on the raw side of the regenerator.

TEST 10: *Milk-Flow Controls - Milk Temperatures at Cut-In and Cut-Out*.

All recorder/controllers used in connection with any pasteurizer, except HHST in which the flow-diversion device is located at the end of the cooler section, shall be examined. This test assures that the cut-in/cut-out flow diversion is operating correctly. *Under-pasteurized* product *must not enter* the forward flow mode of the operation but must be diverted until the product temperature is brought up to the correct pasteurization temperature

TEST 11: *Continuous Flow Holders - Holding Time*.

This test is performed every six months and perhaps is the most critical of the pasteurizer operation. Those pasteurizer operations utilizing holding time of 15 seconds or more require this test.

The continuous flow holders are to assure a minimum hold time as dictated by the established pasteurization process because every particle of milk or product shall be held for at least 15 seconds in both the forward and diverted flow positions. Frozen dessert mixes are required to be held for at least 25 seconds in both flow positions.

An inspection seal is placed on the timing pump to prevent tampering with its speed (e.g. speeding the pump up). However, there may be a need to break that seal in order to repair the pump and its functional accessories. Upon completion of the repair work, the continuous flow holders - holding time must be re-established. The subject pasteurizer unit should not be used until it has been checked by the state regulatory agency and the timing pump resealed.

TEST 12: *Thermal Limit Controller for Control - Sequence Logic*.

*This test is applicable to all HHST pasteurizers using indirect heating*. A problem here is in the potential heat loss and temperature drop in the milk or product after the holding tube. The thermal limit controller assures that the pasteurizer shall not operate in the forward flow mode until the product surfaces downstream from the holding tube have been sanitized on start up. Also, these same surfaces shall be exposed to fluid at pasteurization temperature for at least the established pasteurization time. Should the product temperature fall below the pasteurization standard in the holding tube, the product would not be permitted to flow forward until the product contact surfaces of the equipment downstream from the holding tube have again been cleaned and sanitized.

TEST 13: *Setting of Control Switches for Product Pressure in the Holding Tube*.

Those HHST pasteurizers *using direct contact heating* require this test, which depends on product pressure in the holding tube to maintain a forward flow mode of operation. Basically, the pasteurizer shall not operate in the forward flow mode unless the product pressure in the holding tube is a least ten (10) psi above the boiling pressure of the product. The reliability of a pressure control switch is checked with this test.

TEST 14: *Setting of Control Switches for Differential Pressure Across the Injector*.

This test applies to the HHST pasteurizers *using direct contact heating*. Focus is placed on the steam injector. For the pasteurizer to operate in forward flow the product pressure drop across the injector must be at least 10 psi. This is accomplished by checking and adjusting the differential pressure controller.

Though compliance with the above 14 tests does not *guarantee* "absolute" safety, these tests document pasteurizer performance and greatly increase the chances of processing safe dairy products. Properly pasteurized dairy products that are not post process contaminated have a long history of being safe. There is no question that pasteurization is effective as a part of the "Safety Net".

**Job Performance of the Dairy Production Staff**

The dairy production staff contribute essential knowledge to the milk processing scheme. Each individual on that staff has unique strengths and weaknesses in his/her educational background depending on the type of academic training and work experience that the individual has received. As one combines technology with management, there is a greater need for accurate business information and updated technical knowledge. In today's food manufacturing environment, key plant operations personnel must have technical insight and understand essential principles and practices to remain efficient, competent, and to be effective managers.

To maintain an effective competency, key production staff and employees should attend educationally oriented workshops, meetings and conferences targeted to specific subject matter or issues (4). Hence, the dairy production staff can be better informed and able to respond to daily crises that constantly impact the dairy's maintenance of product safety and quality.

Employee supervision and record keeping practices are other factors that affect the "Safety Net". Employee supervision is important to assure that expected performance of tasks are accomplished. Often, the daily communication and interaction between the employee and management can be the essential human ingredients to prevent potential problems and to achieve expected performance.

Likewise, record keeping practices and the use of the production data collected can strengthen the "Safety Net". If a record keeping system is to be effective, it must provide useful information for making decisions and document that the process(es) have been done according to company requirements. Information from these records should be able to reconstruct the activities for the segment of production that has experienced problems. Also, these records should be accessible to a number of the key production staff rather than only one or two priviledged individuals.

### Quality Assurance Functions

A third layer in "Safety Net" performance is the quality assurance and quality control functions. Quality control monitors *production performance* while quality assurance dictates practices that impact *product safety* and performance.

Quality control functions should involve the record collection system, process documenting, record distribution to key personnel for review, and be easily retrieved. The information reported should provide a "pulse" for the dairy plant's many operations. Included in these functions should be established "triggering" mechanisms that initiate appropriate responses and follow-up on given problems or situations.

Other purposes of quality control functions are to prevent quality deficiencies, monitor product quality performance, maintain smooth plant operations and to deliver the products effectively to satisfied consumers. To support these functions, established quality programs are implemented and enforced. Many of the quality assurance criteria used are generally more stringent than the minimal standards established through the regulatory process. The effectiveness of quality control programs hinges on the technical insight of the plant management and quality control personnel to structure testing activities for adequate monitoring of the various plant operations. These activities may include, but are not limited to: assessing selected quality parameters of the incoming raw milk supply, food ingredients and packaging materials; monitoring the cleaning effectiveness of the CIP operation for the plants' food contact surface areas; performing routine sanitation surveys of the plant environment; the examination of finished product for safety, composition, flavor and wholesomeness; and waste point sources control.

If there is a weakness in the "Safety Net", the lack of good quality assurance and quality control activities account for it. These activities must be performed with consistency on a day-to-day basis. Therefore, the competency of the personnel conducting the programs is critical if quality of the products is to be achieved and maintained. However, these personnel and their activities are frequently viewed by top management as *cost centers* that cut into the profits of the dairy plant's operation. While recognized as important to the operation, a waning management commitment is made to hire and adequately pay technically qualified employees. With this same management attitude, laboratory equipment acquisition and the adoption of updated methods to monitor specific quality parameters are often deferred or are given a low priority for capital expenditures thus lessening the effectiveness of quality control's functional role.

Another weakness in the "Safety Net" occurs when the quality control activities come under the direct supervision of the production management. This type of organizational structure can bias production decisions in favor of shipping "questionable" quality products. Quality control information should be channeled directly to top management. When quality problems arise, a cooperative partnership should occur between the quality control personnel and the plant management to resolve the problem areas under the watchful eye of the chief executive officer of the company. Thus, the dairy products produced will truly be put to the quality test and strengthen the "Safety Net".

### Laws and Regulations Governing the Dairy Industry

The last layer affecting the "Safety Net" is the regulatory process. This process involves principal regulatory promulgation and enforcement by the respective state health departments and where applicable, state department of agriculture. To assure uniformity on the national level, the U.S. Food and Drug Administration and the U.S. Department of Agriculture institute federal guidelines and regulations relative to the safety and wholesomeness of the food supply.

Fortunately, the dairy industry constantly addresses health, safety and processing issues through participation of milk producer cooperatives, processors, academia, and regulatory professionals in the Interstate Milk Shippers' Conference (2). Issues from the various technical, scientific and professional points of view are examined at the conference with the periodic development and updating of the Pasteurized Milk Ordinance which serves as a model for regulatory and guideline development at the federal and state levels. Therefore, consistency in regulatory enforcement and uniformity of adopted principles and practices by the dairy industry to enhance the delivery of safe and wholesome dairy products is achieved.

However, the presence of laws, regulations and guidelines does not guarantee a safe and wholesome product. Adherence to proven principles and practices behind these regulatory foundations assures the probability of delivering a safe and wholesome product. The regulatory professionals document that the food being processed is not being adulterated or handled under conditions that could lead to a safety problem.

The regulatory professionals are specially trained in the inspection and rating of processing plants (8). But, as equipment and process systems become more sophisticated there are potential problem areas that could be falling through the "Safety Net". Therefore, the dairy processing plants must involve the state health departments in the review *for process modifications* and must provide them with updated, accurate engineering drawings and flow charts (3, 4, 5, 6, 7). The regulatory agencies in turn should employ an equipment specialist who is trained in the engineering aspects of equipment and process design, installation practices, and operations of all types of pasteurization systems. Also, regulatory professionals should attend educational programs that include a broad spectra of input from the regulatory, industrial and academic perspectives. A constant emphasis should be placed on understanding the basics and then extrapolating these basics to the issue of concern (4).

Inconsistent enforcement of the dairy related regulations because of the political environment that exists in some states can contribute to a weakness in the "Safety Net" (9). Party politics and the placement of less than qualified regulatory professionals into critical law enforcement positions can result in enforcement problems. Regulatory professionals who have responsibility for food safety and sanitary law enforcement should be employed for their professional competency and not for their political loyalty. In adopting the latter hiring practices the state agencies get consistent, competent job performance and the "Safety Net" is strengthened.

**Performance of the "Safety Net"**

Professionals in the milk delivery system must improve their job performance to strengthen the "Safety Net". Information and resources are available to assist the dairy industry in delivering a safe, wholesome food product. Safety and quality programs require commitment and consistent professional performance of employees. The safety and quality of dairy food products do not happen by accident but require constant awareness of the production and processing environment. Assuring safety and quality is a partnership shared within the plant management team and periodically reviewed by the regulatory agencies. The dairy industry has *too much to lose* in time, money and labor to deliver a poor "Safety Net" performance. If the dairy industry is to be in the news, let that news be that dairy products are safe, of high quality, and contribute to the well being of the consumer.

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## Bob Sanders New IAMFES Secretary

Bob Sanders through vote of the IAMFES membership will begin his term on the IAMFES Executive Board in August, 1987.

Bob is currently serving as Deputy Chief of the Milk Safety Branch for the Food and Drug Administration. He has been in the headquarters office since 1972. He has also served as Milk and Food Consultant in New York (Region II) and Chicago (Region V). He has over 25 years of active duty as a commissioned officer in the United States Public Health Service.

Before entering the Public Health Service he spent ten years in milk sanitation work in his native state of Iowa. Two as a milk rating officer for the State Health Department and eight as Chief Milk Sanitarian for the city of Des Moines. He is a 1950 graduate of Iowa State University in Dairy Industries and holds an MPH from the University of Michigan.

He has been a member of IAMFES and the Iowa affiliate of IAMFES since 1954 and is a past president of the Iowa affiliate. He has served on many committees for IAMFES. He is currently on the Journal Management Committee for *Dairy and Food Sanitation*, the Farm Methods Committee, and is one of IAMFES's representatives to the Sanitarians Joint Council, and currently is serving as Secretary-Treasurer of the council.

Bob is FDA's designated member of the Executive Board of the National Conference on Interstate Milk Shipments and the Steering Committee of the 3-A Sanitary Standards Committees.

Bob and his wife Grace live in Gaithersburg, Maryland. They have two sons and four grandchildren. Their hobbies include golf and square dancing.

## Bauman Received 1987 Minnesota Section Macy Award

Dr. Howard E. Bauman, Vice President of Science and Regulatory Affairs of the Pillsbury Company, is the recipient of the 1987 Harold Macy Food Science and Technology Award, which has been presented annually since 1981 by the Minnesota IFT Section. The award is given in recognition of an outstanding example of food technology transfer or cooperation between scientists in areas of service represented by universities, government or private industry.

Bauman was nominated for the award as a result of his association with the Pillsbury Company's Hazard Analysis and Critical Control Point (HACCP) system. The original HACCP system was developed by his group in the 1960's. Since then, it has been widely adopted by numerous governmental agencies, industrial groups, and academic institutions. It represents a significant industry sponsored transfer of technology to the food science community.

In addition to his HACCP contribution, Bauman has been actively involved with the Food Research Institute's sulfite hypersensitivity program, the Conference of Food Protection's nutritional issues, and Project Sustain's volunteer programs to increase food technology awareness in developing countries.

Bauman is a former president of the Minnesota IFT section. He is currently active in IFT's National Nutrition, Toxicology, and Safety Evaluation divisions. In addition, he is the current chairman of the National Food Processors Association, Miller National Federation Nutrition Committee, and the Research and Development Associates Committee on the Absorption of Iron when Soy Protein is Consumed. He is also the vice chairman of the American Medical Association Food Industry Liaison Advisory Panel.

## "Natural" Meat A Matter of Definition

From cereal to fruit juice drinks, there are plenty of products labeled "natural" in the supermarket. Now we can add meat and poultry to that list.

What is "natural" meat and poultry?

According to Texas A&M University Agricultural Extension Service nutritionist Marilyn Haggard, the U.S. Department of Agriculture has three rules for using the term "natural" on a meat or poultry product.

"To wear the natural label, meat or poultry must have no coloring or artificial ingredients," she says.

"The second requirement is that it have only minimal processing," the nutritionist says. "Examples of minimal processing include cutting, grinding, canning, drying or freezing."

"The label must also explain use of the term," Haggard reports. "For instance, a label might state "Natural beef - no added coloring or artificial ingredients; minimally processed."

Meat and poultry labels may also carry animal production claims, such as "fed grain grown without the use of pesticides," reports the nutritionist.

Vague terms like "chemical-free" and "organic" are not allowed according to USDA regulations, she emphasizes.

In addition, Haggard says any company using animal production claims on a label will have to document that the claims are accurate. Those animals would have to be raised and transported separately from other livestock or poultry to assure that the two groups of animals don't get mixed together.

The nutritionist points out that consumers will probably wind up paying more for meat or poultry with a natural label or a production claim.

"The natural label meat and poultry products are likely to be safe, wholesome and nutritious, but so are the regular products, which meet rigid production and labeling standards of their own," notes Haggard.

## Food Microbiology Short Course

A basic microbiology short course for food processors will be offered at the University of California-Davis from September 14-18, 1987. This course will consist of lectures and laboratory work. Certificates of completion will be issued. The objective of this course is to develop an understanding of basic food microbiology. This course is appropriate for people with limited training in microbiology. This course has no prerequisites.

Lecture material will begin with an introduction to microbiology, and will include basic lab procedures, various groups of microorganisms important in food processing, and conclude with a discussion of new techniques in food microbiology.

Lab topics to be covered include use of a microscope, standard plate count, most probable number, membrane filter techniques for enumerating bacteria, and others.

Enrollment will be limited to 32 students. The registration fee includes reference and lab materials and two dinners. For registration information and further details, contact: Kathryn J. Boor, Food Science & Technology, 250 Cruess Hall, University of California, Davis, CA 95616. Telephone: 916-752-1478.

*Robert L. Nissen*

## DFISA Honors Nissen With Highest Service Award

Robert L. Nissen, formerly vice president of sales, Ladish Co., Tri-Clover Division (now Tri-Clover Inc.), has been selected by Dairy & Food Industries Supply Association (DFISA) as recipient of DFISA's Honor Award, the association's highest award given to members for outstanding service. Nissen received the award at DFISA's Annual Conference, April 1, 1987 in Orlando, Florida.

The presentation of the award was made by DFISA President Robert C. Anderson, Jr., Anderson Instrument Co. Nissen is only the 26th recipient of the award in the association's 68 year history. He has been actively involved with DFISA for 27 years.

Nissen served on the association's Technical Committee since 1960, becoming chairman in 1972. He was elected to DFISA's Board of Directors in 1975 and served as President from 1984-86. In addition, Nissen was chairman of the Food & Dairy EXPO Site Selection Committee, member of the EXPO Credentials Committee and DFISA representative to the 3-A Sanitary Standards Steering Committees, for the past 15 years.

In 1983, Nissen received the 3-A Honor Plaque. Although now retired from industry, he is still active in 3-A Sanitary Standards programs and the 3-A Symbol Council.

## *Why Drink Bottled Water?*

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"Bottled water can be an alternative to the off-taste of hard tap water, the additives in sodas and other beverages, and can replace alcohol," says Mary Kinney Sweeten, a nutritionist with the Texas A&M Agricultural Extension Service.

"Some people on restricted diets will also find bottled water helpful, because some minerals in tap water, like sodium, may be too concentrated for their dietary recommendations," she adds.

With the increasing variety of bottled waters now on the market, it's sometimes difficult to know what you're buying, Sweeten says. She suggests using the Food and Drug Administration definitions for bottled water to help decipher the labels.

- "Natural water" is water that hasn't been changed. Nothing has been added or taken out.
- "Naturally sparkling water" contains enough carbon dioxide to be naturally bubbly. Sparkling water has carbon dioxide added.
- "Spring water" runs naturally out of the ground and is usually bottled near that site.
- "Drinking water" is noncarbonated. It's usually substituted for tap water.
- "Purified water" is demineralized. Distilled water is purified water that has been vaporized and recondensed.
- "Mineral water", according to the FDA, "has no standard of identity." However, The International Bottled Water Association says it "contains not less than 500 parts per million total dissolved solids."
- "Seltzer water" is carbonated tap water with no added salts.
- "Club soda" has added salts, minerals and carbonation. The FDA views it as well as seltzer, club soda, and naturally sparkling water as soda water. Thus, up to 0.02 percent caffeine and 0.5 percent alcohol by weight may be added by manufacturers.

"Read the label carefully and make sure what you're buying is what you want," Sweeten warns. "Bottled water has no more nutritional value than tap water. It just may taste a little better and may not contain some of the minerals and impurities that come out of the tap."


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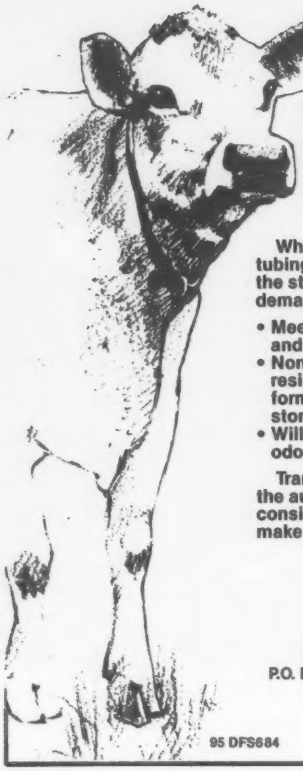

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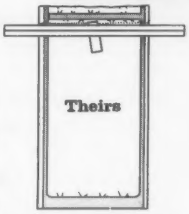


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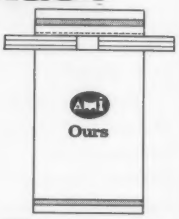


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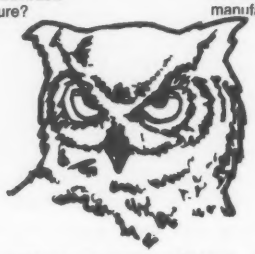

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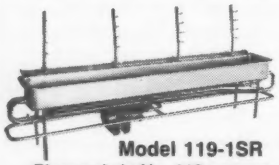

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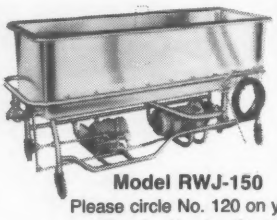

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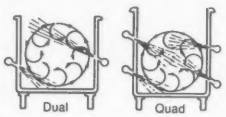


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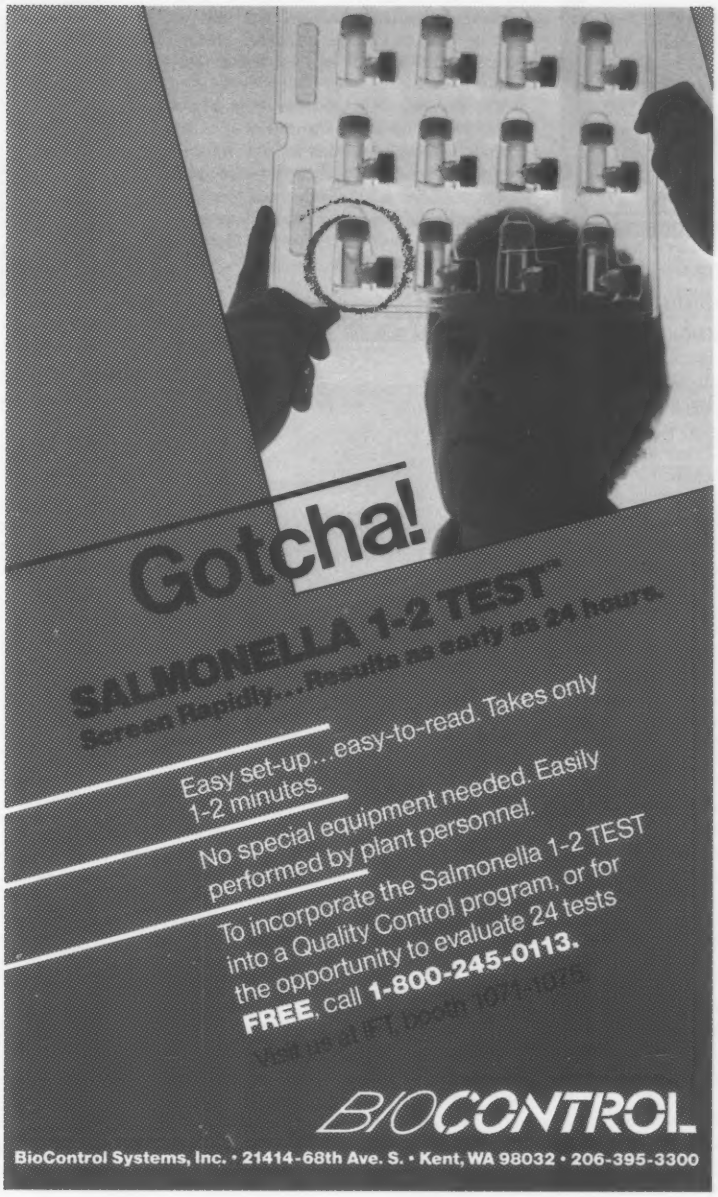
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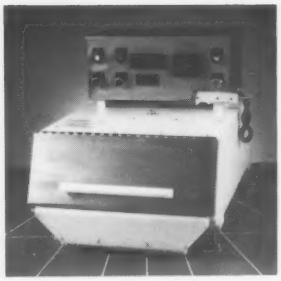

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• Labconco Corporation, Kansas City, MO., introduces their NEW Protector Hood "Rapid Selection Guide". This 12-page, full color catalog features popular models of Protector Fiberglass Hoods and accessories.

The introductory section of the new catalog points out features of Labconco's Protector hood line which make it safe and convenient to use, and economical to install. Then the advantages of integral blower hoods vs. remote blower hoods is compared. Next, a color-coded chart allows you to choose a complete fume removal system to fit your specific needs. Specifications and dimensional data are then detailed for the Protector -48, -60 and -72 hoods.

Also included in the brochure is information on Labconco's International Protector -48 Fiberglass Hoods. International hoods combine the features of the Protector Fiberglass Hood along with the popular needs of most international customers. This includes an integral blower, remotely-controlled cold water gooseneck faucet, two service fixtures and choice of 115-volt or 230-volt electrical configuration.

The last section of the catalog features accessories including cabinets, work surfaces, blowers, and ductwork and accessories. To help select the correct accessories for your fume hood, the catalog has an easy-to-follow selection guide for cabinet selection and Coated Steel Blowers.

Labconco fume hoods are available through major laboratory dealers worldwide. For a free copy of their new catalog and a list of their international dealers, contact Susan Gregory, Labconco, 8811 Prospect, Kansas City, MO 64132. Telephone: 816-333-8811 or 1-800-821-5525.

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## The Mikro PSA

• The Mikro PSA is the state of the art in dry powder analyzing. The unique action given by the special sieve cleaning system makes short work of analyzing on fine screens.

An electronic panel board allows repeated time intervals for sieving from digital memory and percent calculations, all displayed on a large LED.

The sieves used on the PSA can be purchased separately as direct replacements for similar imported sieving devices. These sieves are "Made In America" with Quality Workmanship at a lower cost.

The PSA is an excellent tool for your Quality Control & Development Department. The speed and repeatability of analysis results is unmatched in dry powder sieving. Results are not operator sensitive.

They can be used as a small production device for generating very small quantities of precise separated dry powder for R&D purposes.

For more information, contact: D. A. Scott, Pulverizing Machinery, Division of MikroPul, 10 Chatham Road, Summit, NJ 07901. Telephone: 201-273-6360; in Canada, 416-791-3883.

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## Cap Snap Co. Announces The 38 FT - New Pull-Tab Foil Liner

• Cap Snap Co., manufacturer of tamper-evident plastic closures, announced today that it is in its third month of volume shipments of a snap-on closure which incorporates an inner foil liner with a pull-tab. The company is one of the first to deliver production quantities of a snap-on cap with this feature.

The new generation pull-tab cap ensures that the foil is easily and completely removed. The foil pull-tab seal increases safety and practicality levels for consumers.

According to Jack Watts, Cap Snap's president, "While we have been successfully producing foil lined caps for use by dairies for quite some time, our new liner represents a technological breakthrough that promises to greatly extend our market reach." Watts added that by the beginning of 1987, the company will have full production capacity to meet all consumer demands.

Cap Snap Co., founded in 1964, designs and manufactures tamper-evident plastic snap-on closures and application systems for the dairy, juice, water and institutional food industries. The company manufactures products at its facilities in San Jose, Kingsport, Tennessee and soon in the Albany, New York area.

Cap Snap Co.'s headquarters and its newly opened research and development facility are located at 890 Faulstich Court, San Jose, CA 95122. Telephone: 408-295-9922.

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## Durafab Garments Excellent Where Lint and Dust Control are Necessary

• It's very important that foreign particles of dirt of any kind not be transferred into dairy products from a worker's garment. This is particularly true in milk, butter and cheese processing plants.

While not clean-room designated garments, Durafab offers a complete line of reusable/disposable garments made of DuPont's Tyvek®, a spun-bonded olefin that offers low linting and low particle generation. The low cost of these garments becomes insignificant when compared to the cost of rejected or reduced quality of products produced.

In laboratory tests to determine linting characteristics, three materials were studied: Tyvek, a heavyweight cotton fabric, and a scrim-reinforced paper material. Samples were precleaned, enclosed in a polyethylene envelope and flexed 500 cycles in a stress-flex tester. After flexing, materials were vacuumed and loose material was collected on a filter and counted. Test results were:

| | Tyvek #21 | Cotton | Paper |
|---|---|---|---|
| Fibers per sq. inch | 0.7 | 29 | 9 |
| Particles per sq. inch | 3.9 | 280 | 115 |

These test results indicate that Tyvek reduces fiber generation by 92 percent versus paper and 98 percent versus cotton; and particle generation by 96 percent versus paper and 99 percent versus cotton.

Durafab, one of the world's largest manufacturers of reusable/disposable garments, offers a wide range of products including pants, shirts, coveralls, smocks, lab coats, caps, shoe covers, aprons and snoods. Custom designed garments for specific needs are also available.

For more information, contact: Mr. Lynn Goldstein, President, Durafab®, Durafab Inc., P.O. Box 658, 1102 Kilpatrick, Cleburne, TX 76031. Telephone: 1-800-433-1824; in Texas 817-645-8851.

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## Membrane Technology Seminar

• OSMO® Membrane Systems will sponsor two seminars on Membrane Technology in 1987, June 3 & 4 and October 21 & 22, at their facilities in Minnetonka, Minnesota.

The Seminar, entitled, "Crossflow Membrane Filtration," will be oriented toward engineers, managers or persons responsible for water treatment, pollution control or process engineering. Topics covered include the use of crossflow RO, UF and MF membranes for industrial water treatment, medical/pharmaceutical water treatment, waste water reclamation and the recovery of metal salts, oils and other organics from waste or process streams. The seminar will cover the fundamentals of reverse osmosis, ultrafiltration and microfiltration, total system design considerations, storage and distribution of water, and the "zero discharge" approach to pollution control. Hands-on equipment operation, installation, start-up and repair is included.

For more information, contact: Ms. Elizabeth Hobbs, Travel & Seminar Coordinator, OSMONICS, INC., 5951 Clearwater Drive, Minnetonka, MN 55343. Telephone: 612-933-2277.

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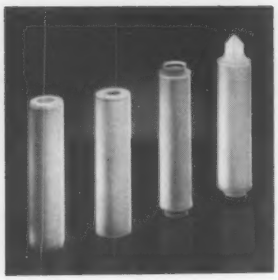

## Pall Profile® Absolute Rated Depth Filter Elements

• Pall Profile® filters, absolute rated depth filter elements, are designed to remove particulate contamination and spoilage microorganisms from beverages and liquids and gases used in food manufacturing processes. Available from the Pall Food and Beverage Division of Pall Ultrafine Filtration Corporation, Profile filters are offered in a variety of configurations to suit all processing requirements and ensure a reliable and economical means of filtration.

Typical applications of Profile filter elements include cost effective replacement of plate and frame type filter equipment, polishing filtration of beverages, filtration of hot and cold water, haze removal, prefiltration prior to ultrafiltration, and clarification and removal of carbon from edible oils.

Pall Ultrafine Filtration Corporation manufactures abroad selection of disposable and cleanable filters which economically remove bacteria and particles to below 0.1 μm from process liquids and gases. The Pall Ultrafine Filtration Food and Beverage Division serves the specific high purity requirements of the brewing, wine and cider, soft drinks, mineral water, spirits, and food and dairy industries.

Pall Ultrafine Filtration Corporation is a subsidiary of Pall Corporation, an international leader in the design, production, and manufacture of filters and other fluid clarification devices for fluid processing, aerospace, fluid power, and biomedical applications.

For more information, contact: Marcia Fulton or Diane Maiorca, Pall Corporation, East Hills, LI, NY 11548. Telephone: 516-484-5400.

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## High Efficiency Advanced-Membrane Systems Produce Low-Cost Nitrogen

• Advanced membrane systems that generate nitrogen on-site for as little as a tenth the price of merchant nitrogen have been commercialized by Permea Inc., the company announced today.

These nitrogen systems, branded Prism Alpha, use hollow-fiber membranes to separate air into a nitrogen stream and an oxygen-rich stream.

Permea, a Monsanto company, says the systems are up to four times more efficient than previous membrane-based nitrogen systems, and this efficiency translates into nitrogen at a lower cost than conventional merchant nitrogen.

"Depending upon the user's location and the volume of nitrogen purchased, Prism Alpha systems can generate nitrogen from a half to even a tenth the cost of merchant nitrogen," said Earl Beaver, Permea's director of business development.

Beaver said Prism Alpha systems are lightweight, compact and reliable. They also require no operator attention and minimal maintenance.

He said these features make them especially attractive for remote locations and mobile applications, such as in the transportation of perishables or inert blanketing on aircraft, ships and offshore oil production platforms. Systems are available in capacities ranging from less than a hundred to more than a million standard cubic feet per hour.

Beaver also said Prism Alpha systems can be scaled to produce nitrogen of the precise purities needed for special applications. "For example, controlled atmospheres for the storage of apples need about a 2 percent oxygen content," he said. "Prism Alpha systems are ideal for that application."

Markets initially targeted by Permea for commercialization of Prism Alpha nitrogen systems include the chemical and hydrocarbon processing industries; off shore oil and gas production; metal heat treating; controlled atmospheres for preservation of perishables; and the packaging of foods, pharmaceuticals and paints.

Permea said a new brochure describing Prism Alpha nitrogen systems and their applications is now available. For a free copy, write or call Permea Inc., 11444 Lackland Road, St. Louis, M0 63146. Telephone: 314-694-8000.

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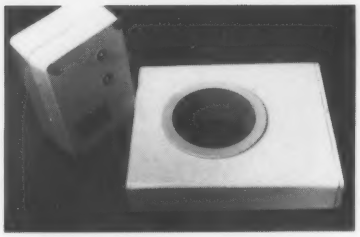

## Auto Phase Metal Detector For Form, Fill and Seal Machines, Operates Unattended

• Goring Kerr's new Model SC Metal Detector for installation in vertical form, fill and seal machines, has a unique Auto Phase feature which allows the unit to operate unattended once the sensitivity has been set.

Auto Phase, a standard feature on all Goring Kerr metal detectors, eliminates the need for constant monitoring and dependence on operator efficiency. With conventional units, the operator should readjust the phase each time temperature variations cause a change in the phase of the detector. With Goring Kerr, however, phase adjustments are automatic, ensuring that the detector maintains maximum sensitivity at all times.

For easier installation in the constricted vertical space above the yoke of the form, fill and seal machine, the SC detector is available in two compact models: the SC 3 and the SC 4 (3" and 4" deep respectively).

Other features of the Goring Kerr Model SC are Automatic Balance Control, which adjusts for possible drift in the detector coils; self-check circuitry, which monitors performance; and plug-in boards that permit in-plant service.

For more information, contact: Jan Schutz, Goring Kerr, Inc., 85 Oriskany Drive, Tonawanda, NY 14150. Telephone: 716-876-6900.

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## SPECIAL REPORT. . . FOOD IRRADIATION

*By Bailus Walker, Jr., PhD, MPH, Commissioner of Public Health, Commonwealth of Massachusetts*

The accident at the Chernobyl nuclear plant in the Ukraine has raised new questions about the safety of food irradiation. Indeed, for many people, the mere mention of food irradiation raises the spectre of nuclear contamination, nuclear weapons, and related fears and controversy. Some observers suggest that food irradiation will increase the risk of occupational and environmental exposure to ionizing radiation.

Radioactivity is not the problem. Food does not become radioactive as the result of irradiation.

What FDA is required to address are the acute and chronic health effects of compounds that radiation may produce in foods. Most of these radiolytic products are food constituents - fatty acids from the degradation of triclycerides, or amino acids from the breakdown of proteins - which an FDA study group has determined to be non-toxic.

Also of concern are the so-called 'unique dadiolytic products,' URPs to mean substances produced by irradiation that are not found in nonirradiated food. According to an FDA committee which studied them, many URPs may also be common constituents in the human diet and of no consequence to health. At radiation doses of less than 100 kilorads, the quantity of URPs in radiated foods is so minimal that they are difficult to detect and are deemed to be toxicologically insignificant. To critics of irradiation, however, they are viewed as possible carcinogens.

Irradiation of herbs and spices to control insects and microorganisms has been permitted since 1984. Much wide use of radiation in food protection was encouraged last year when the Food and Drug Administration approved low radiation doses (up to 100 kilorads) to control trichinosis in pork. And earlier this year, FDA approved the use of low-dose radiation to inhibit ripening and spoilage of fruits and vegetables and to destroy harmful insects. Whether radiation processing continues to expand will depend on several factors, including cost effectiveness compared to other processes, and consumer acceptance.

There is, of course, a regulatory issue involved. Amendments to the federal Food, Drug and Cosmetic Act in 1958 specifically defined the source of irradiation as a food additive rather than as a technological process. Thus, FDA is required by the FD&C Act to determine the safety and wholesomeness of irradiated foods, just as it must with chemical additives.

The U.S. Department of Agriculture has been focusing increasing attention on irradiation as a process to control the bacteria that cause foodborne disease. Gastrointestinal illnesses cost billions of dollars a year in medical expenses and lost wages. Irradiation of fresh meats and poultry would eliminate most of the pathogens. Consequently, USDA intends to petition FDA to approve irradiation of chicken parts in doses of 250-300 kilorads.

On the international level, countries throughout the world are irradiating food commercially. Food irradiation facilities are operating in the USSR, Hungary, Japan, South Africa, Chile, and Brazil. Facilities are planned or are under construction in France, Mexico, Nigeria, Pakistan, Thailand, Bangladesh, Sri Lanka and South Korea.

The future of food irradiation is difficult to predict, despite the significant progress now under way. While FDA's activities are enhancing developments in this area, it is too early to know whether the food industry will take full advantage of this technology to further insure a safe and adequate food supply.

**"HORIZONS"**
NYSMFS Newsletter Nov. '86

## MOBILE COMPUTERS FOR RESTAURANT INSPECTIONS

Food service sanitarians in Benton County, Oregon have been using hand held computers to record violations and print inspection reports in the field. The small computers store over sixty common violation phrases and the required corrections. The sanitarian keys in the three digit violation code and adds specific descriptions to further specify some violations. At the end of the inspection the computer is plugged into the battery operated printer and the inspection report is generated.

The report is printed in about 30 seconds. The computer is so small that the sanitarian carries it during the inspection so hand written 'reminder' notes are not needed. The printer, computer, thermometers, flashlite and other equipment all fit into a carrying case the size of a briefcase.

Reports are printed on forms and are standardized yet allow for flexibility for unique situations. The computer has a built-in clock and calendar which prints the time and date without keying in this information. The more critical violations are sorted and printed first. Inspection reports can easily be edited if changes are desired. Oregon's food service regulations are almost identical to the FDA model code where each violation is assigned a point value. Points are automatically calculated.

Restaurant owners have reacted positively to the new technology. They especially appreciate that the reports are legible.

It is estimated that the computers will save enough field time that payback should be about 6 to 8 months. Information about the inspection is saved at the end of the inspection and later 'downloaded' into an office personal computer where a data base program generated a monthly report. No longer is there a need to hire data entry personnel for this task.

The software was developed over the last four years with approximately $80,000 research and development costs, reports the software company. The program is very reliable and the office personal computer will be able to 'upload' information into the hand held computer; the sanitarian will not have to key in the name and address of the restaurant, just the preassigned restaurant number.

Richard Swenson, sanitarian at Benton County, initiated the project with 'fear and trepidation' after he gained the support of the County Board of Commissioners. He says, 'there is nothing worse than a good idea that flops in the field in front of the restaurant personnel. The venture was a risk since I was not sure it would work, be well received by the sanitarian, and actually save the costs that indicated to the Commissioners that I though it would.' Jan Heron, R.S., the first sanitarian to use the program in the field, says: 'It took a while to work the bugs out but I never want to do another inspection without the hand held computer. It saves so much time.'

Swenson believes this technology will revolutionize inspections and free up time previously spent on report writing for more important work. He along with fellow staff, are now developing a software program to assist the sanitarian in soils analysis for on-site sewage disposal.

The computer is a Hewlett Packard with a Think-Jet printer. The system is IBM compatible. For information about the program contact: Oregon Digital Systems, Inc., P.O. Box 367, Corvallis, OR 97339. Oregon Digital specializes in the use of hand held computers for field use.

Reported, with permittion, from **Food Protection Report,** March 1986, published by Charles Felix Associates, PO Box 1581. Leesburg, VA 22075. Tel. 703-777-7448.

NYSMFS Newsletter Nov. '86

**FDA Recalls "Comycin Powder for Children"**

A powder illegally imported apparently from Thailand for sale as a nonprescription product for children has been found to contain a potentially dangerous prescription drug, the Food and Drug Adminstration warned today.

The product, sold as "Comycin Powder for Children" in New York and possibly elsewhere, is labeled in English as containing chloramphenicol. **FDA** lab tests confirmed the presence of the ingredient, which sometimes produces fatal anemia. The amount of Comycin Powder for Children that has entered the United States is not known.

The use of chloramphenicol in the United States is by prescription only and is restricted to meningitis and other severe infections. The **FDA** approved prescription labeling specifically warns against using the drug to treat minor diseases such as colds or flu or to protect against infection- a use that may be made of the Thai product, a cocoa flavored power designed to be mixed with fluid and given to children.

On a tip from New York State, **FDA** found the product at Lee's Oriental Foods in Rochester, N.Y., and traced it to the Bangkok Market in Brooklyn.

Bangkok Market's president, Soo Peechaphand, said only 15 boxes were bought from a Los Angeles wholesaler. **FDA** has visited that firm and other California and New York wholesalers of Thai, Vietnamese and Cambodian products, but they have denied carrying the product. As a result, FDA cannot estimate how much of the product might still be for sale or in homes.

The manufacturer listed on the product is Thai Charden Bhaesat.

New England Country Folks 1/12/87

**TV Sanitation Scores**

Cable TV viewers in Richardson, Texas can tune in every day to a report of the sanitation scores that area restaurants have earned in their most recent inspections. At 10 a.m. and again at 6 p.m. the City Telecable Channel projects a brief overview of the Environmental Health Department's rating of food operations, followed by a listing of the latest sanitation scores. The information is updated weekly. "Our eating out public has shown a keen interest in this type of information and the food service operators likewise," says Cliff Warwick Richardson's chief sanitarian. Sanitarian Bob Galvan says the local restaurateurs have reacted positively to the program. "They feel this is one way to communicate their sanitation levels, which can be good, on a positive note to the general audience," he says. Warwick and Galvan are both available for more information on the program. Write or call: P.O. Box 830309, Richardson, TX 75083.

E.N.D./November-December 1986

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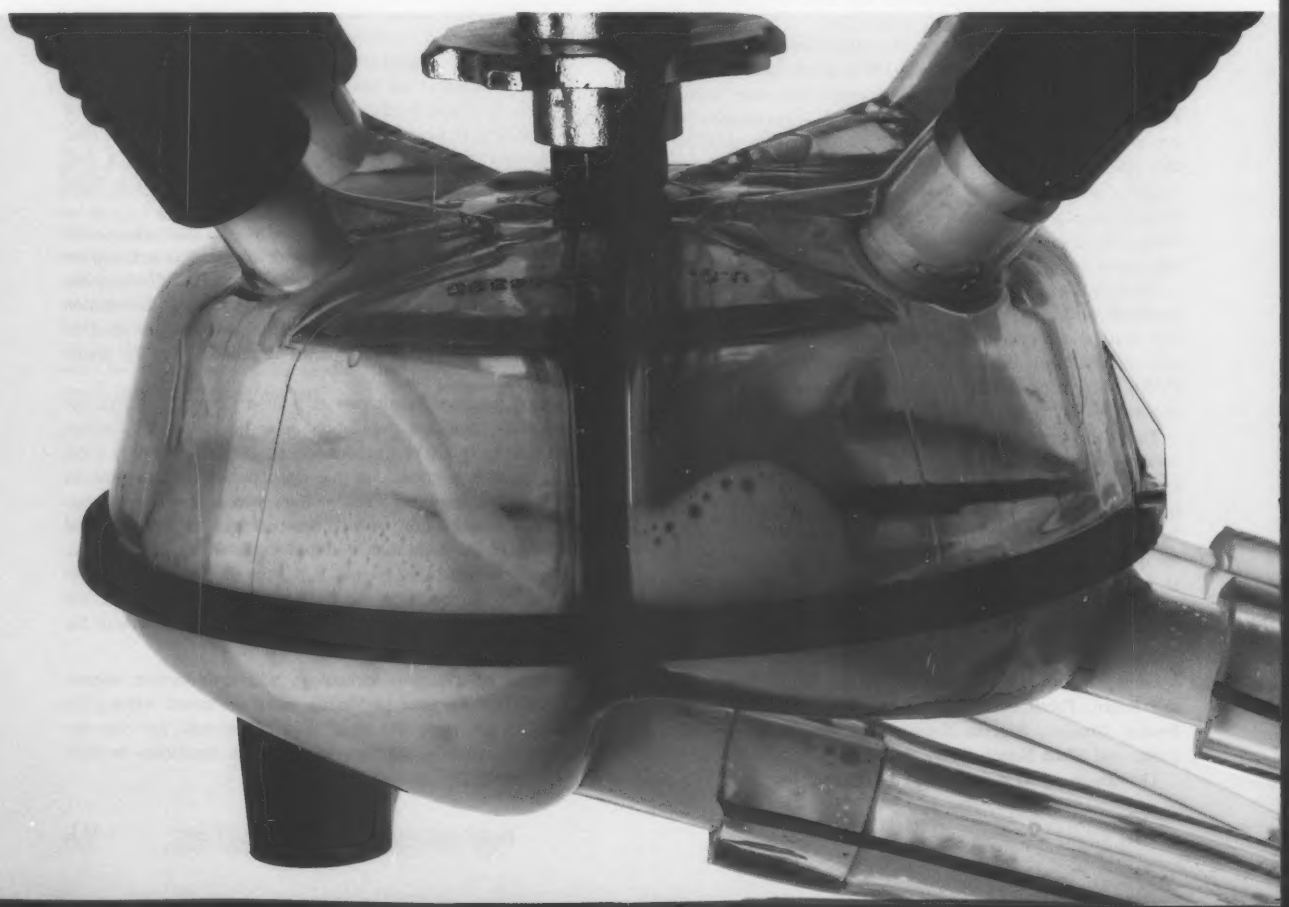

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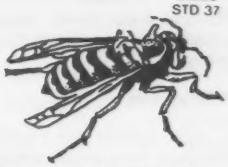

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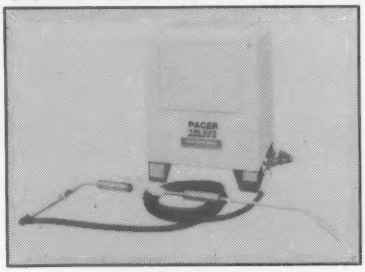

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# How to Implement a SAFE Program

**by Robert E. HarRington**
**Assistant Director of**
**Technical Services and**
**Safety for the National**
**Restaurant Association**

Reprinted with permission from the National Restaurant Association magazine *Restaurants USA* (formerly *NRA News*). This is Part IV of a four-part series.

Many health departments are preparing to implement a new concept in restaurant inspection that emphasizes time/temperature control throughout the preparation cycle of potentially hazardous foods. This series introduces a streamlined version of that program called SAFE (Sanitary Assessment of Food Environment). SAFE can protect your business against an outbreak of foodborne disease by helping you identify, control and monitor the critical points in your food handling and preparation system. This final article of the series will show you how you can perform a SAFE survey in your own establishment.

Traditional restaurant sanitation inspections have focused on construction details and aesthetic appearances - peeling paint, coved corners, dirty floors and so forth. Although this approach has enhanced maintenance and cleaning, it may not address the major factors that are known to cause bacterial foodborne illnesses: contamination of foods with pathogenic bacteria and inadequate temperature control, which allows those bacteria to survive and grow.

A Sanitary Assessment of your Food Environment (called SAFE) can reduce the risk of a disease outbreak in your operation. Based on a system developed in the food processing industry, SAFE helps you to concentrate your food protection efforts on the specific foods at greater risk. It identifies those steps in your production scheme wherein foods could be contaminated and wherein bacteria could survive and grow. Once you identify these *critical control points,* you can devise protective measures to guard against the hazards and include those protections in your standardized recipes and processes.

### *The first step is the decision to begin...*

The first step in your SAFE audit is your decision to do it and your commitment to follow through with any necessary changes in your operations. This is not a casual decision because, like anything worthwhile, SAFE will exact some costs. In addition to minor equipment costs (several dial-indicating thermometers long enough to reach the center of different-sized foods), you will need to make a considerable investment of your most overstretched resource - time. You also may need to invest in training your employees to change their food-handling practices and to monitor the SAFE critical control points.

On the plus side, SAFE will provide you with control points to monitor product quality and consistency; and if someone does complain of illness, SAFE will reduce your liability because you can demonstrate that you have taken more than reasonable steps to maintain clean and wholesome foods.

For the first one or two surveys you perform in your restaurant, you will want to diagram each step in the preparation process and record food temperatures every 30 minutes. Later, when you gain more familiarity with the SAFE system, you can simply monitor against the specifications you build into your standardized recipes and processes.

### *Identify potentially hazardous foods...*

Since it is neither feasible nor necessary to do a SAFE survey for every item on your menu, the first step is to choose which foods you will assess. Concentrate on moist, non-acid, protein foods. These include most meats, poultry, seafood, eggs (out of the shell), milk and dairy products, sauces and gravies, cooked cereal grains and cooked vegetables. Check product labels for directions (for example, "keep refrigerated after opening") or contact the manufacturer for specific handling recommendations.

### *Identify the foods at greatest risk...*

Next, consider the processing factors that increase the risk of foodborne disease:

- **multiple-step preparation.** Increased handling increases exposure to contamination, especially when hands are not clean.
- **temperature changes.** Heating and cooling places foods in the "danger zone" - between 45°F and 140°F - where bacteria grow best. You will want to structure your procedures to minimize the time in this zone; keep foods in the danger zone no more than four hours. Foods which are heated, cooled and reheated are three times more risky than foods heated once for immediate service because they are in the danger zone three times.
- **large volume.** Products in large volumes take longer to heat and cool, thus the bacteria have more time to grow. Also, large-volume items usually require multistep handling, and this increases their risk. A beef Wellington, for example, would be a good candidate for a SAFE survey, but a broiled filet mignon, intended for immediate service, would not require such detailed controls.
- **specials.** Unusual or one,of-a-kind offerings can also increase risks because of the unfamiliar preparation or service style required.
- **natural contaminated foods.** Your SAFE program must consider some foods' naturally high contaminant level. Raw produce can be contaminated by field dirt or pesticides. Raw meats (especially poultry) can be contaminated at slaughter,

and raw seafood, both shellfish and finfish, can carry a variety of viruses, bacteria or parasites.

***Follow the food item through your preparation cycle...***

When you have selected the food(s) for your SAFE survey, your next step is to follow the progress of that item(s) through your establishment - from delivery at the receiving dock to service at the table. Note that potential hazards at each handling step, such as potential for contamination or inadequate temperauure control. Record food temperatures at the beginning and end of each handling step and the amount of time the food is held at those temperatures. For lengthy processes, such as slow roasting, cooling or holding, take temperatures at 30-minute intervals to give you a time/temperature curve which will help you determine if your procedures are adequate to kill bacteria and limit their growth.

When you take food temperatures, be sure to use the thermometer in a way that will give accurate results and not contaminate the food.

- **Calibrate the thermometer.**Better quality food thermometers have a calibration nut so you can adjust the reading on the dial. Temperatures required to boil water (200°F-212°F) and begin the freezing process (32°F) are reasonable reference points.
- **Clean and sanitize the thermometer**stem before and after you insert it into foods. *(A word of caution:*Many food thermometers have plastic dial faces that will melt if they are left in hot environments such as ovens. Also, unless the thermometer is specifically designed for dish machine use, wash it by hand. Otherwise, the dishmachine's high pressure, temperatures and chemicals will ruin it. Of course, be sure to avoid touching food with your hands when reading the thermometer.)
- **Give the thermometer time to respond.**Most thermometers read faster on the "hot" side than the "cold." A cold food may require two to three minutes to reach a stable reading.

***Establish critical control points...***

Your SAFE survey will identify many control points, but only a few will be *critical* control points. Critical control points:

1. ensure against food contamination by establishing procedures for good personal hygiene habits and maintaining clean utensils and surfaces.

2. prevent bacterial growth by holding foods below 45• F or above 140°F and

3. ensure bacterial destruction by cooking foods above 165°F.

When you establish your critical controls and monitoring points, make sure they are feasible. Then standardize those controls so they become part of your regular procedures. The easiest and most effective way to implement these controls is to write them directly into your recipes (for example, "Bake in 325°F oven until center reaches 165°F") or to include them as part of a specific employee's job description. (This gives you accountability control as well.) You can also post signs or tags or require employees to maintain a log of monitoring points, but these techniques are generally less effective because they are not part of the normal job flow.

To check the effectiveness and feasibility of your controls and monitoring points, repeat the survey. You may find that an alternate procedure is needed when the first step does not meet its critical control goal. The most common shortcoming will involve temperature control. For example, if a food fails to meet the required temperature within the specified time period, reheating to 165°F is necessary to eliminate surviving bacteria.

***An example of SAFE principles in action...***

Let's put these SAFE principles to work in an imaginary restaurant. First, we will review the menu to establish which items are good candidates for SAFE. To keep things simple, the restaurant offers only two choices for each course.

For both the stew and the creamy banana pie begin your SAFE procedures by preparing detailed specifications for high-quality products. Inspect all food deliveries for quality and temperature. (Perishable foods must be held below 45°F.) Reject any product which does not meet your standards. Store in clean, dry facilities at proper temperatures and use the first in, first out (FIFO) plan for inventory rotation.

| Menu | Assessment |
|---|---|
| *Tossed green salad* or *Gelatin mold with mixed fruits* | Low-water activity makes these foods not potentially hazardous. However, do guard against cross-contamination from other foods. Keep items refrigerated for quality. |
| *Broiled swordfish steak* | Potentially hazardous item. Keep refrigerated. But since item is cooked "to order," there is no need for a complete SAFE survey. |
| *Old-fashioned beef stew* | Potentially hazardous item because of its multiple ingredients, large volume, multiple steps and heating and cooling requirements. Preparation of this dish should receive a SAFE survey. |
| *Tart lemon pie* | The pie's very acid, low-water content does not make this item potentially hazardous. Keep refrigerated for quality and to guard against contamination. |
| *Creamy banana pie* | The filling is potentially hazardous because of the multiple preparation steps involved and the heating and cooling steps required. A good candidate for a SAFE survey. |

The remainder of the SAFE technique is illustrated in the accompanying flowchart and temperature curve. Although the chart and curve have been prepared for the beef stew, the same principles apply to the banana cream pie and other potentially hazardous foods on your menu.

Rest assured; the process is not as difficult as it first appears. As you become more familiar with the techniques, you may no longer need the flowcharts and detailed diagrams but can rely on your improved knowledge of food safety and your established SAFE procedures to protect your restaurant from foodborne disease.

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**Editors note:** *Due to reader interest in NRA's SAFE program, next month's issue will include an extension of the series and cover viral infections and chemical poisonings.*

***Preventing foreign-body contamination***

Although the primary concern of your SAFE program is to prevent bacterial contamination and growth, you should also be alert to foreign bodies that might find their way into your foods.

Fortunately, most ingested foreign bodies pass harmlessly through the digestive tract, but occasionally a nut or bolt from a piece of equipment can damage teeth. Wire ties, metal shavings or broken glass and crockery can cut the mouth and throat. Even a seemingly harmless toothpick can pierce the intestine. This has caused at least one death.

When you perform your SAFE survey, consider possible foreign-body contamination. Keep equipment well adjusted and use only recommended lubricants; properly dispose of all wrapping and packaging materials; keep all non-food items away from foods; and be sure that toothpicks, skewers or markers are clearly visible in foods. In short, arrange your kitchen processes, storage and materials to keep non-food items out of the foods you serve.

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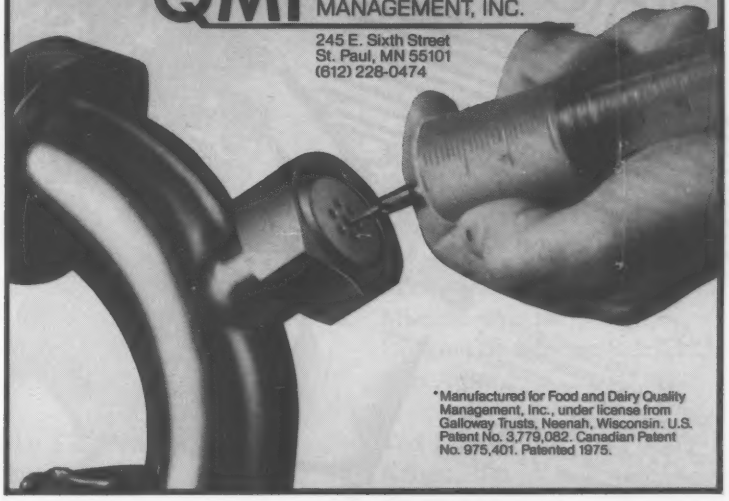

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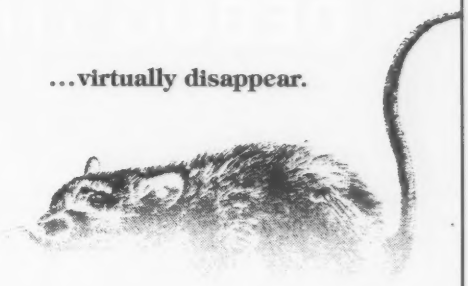

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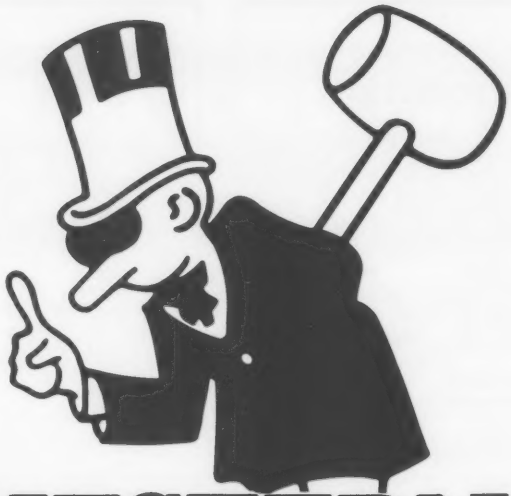

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*Stanley Skelskie, President, leads the first annual meeting of the Georgia Association of Food and Environmental Sanitarians.*

*Dr. Joe Frank of the University of Georgia, Athens, speaks on HACCP concepts at the first annual meeting of the Georgia Association of Food and Environmental Sanitarians.*

*Ray Niles of the Georgia Department of Agriculture speaks on pasteurization of dairy products during the first annual meeting of the Georgia Association of Food and Environmental Sanitarians.*

# Affiliate Calendar

**1987**

**August 2-7, CALIFORNIA ASSOCIATION OF DAIRY AND MILK SANITARIANS BUSINESS MEETING,** to be held at the Disneyland Hotel in Anaheim, CA. For more information contact: Richard Harrell at 213-757-9719 or Austin Olinger at 818-968-9621.

**September 14-15, ASSOCIATED ILLINOIS MILK, FOOD, AND ENVIRONMENTAL SANITARIANS FALL SEMINAR AND ANNUAL MEETING,** a joint conference with the Coop Extension Service, University of Illinois to be held at the Chancellor Inn, Champaign, IL. For more information contact: Dr. Clem Horner, Secretary, Gorman Publishing Co., 8750 W. Bryn Mawr, Chicago, Il 60631 (312) 693-3200 or Dr. Gary Harpestad, Extension Dairyman, University of IL., 315 Animal Sciences Lab, 1207 W. Gregory Dr., Urbana, IL 61801. (217) 333-0510.

**September 15-16, 1987 ANNUAL CONVENTION OF THE SOUTH DAKOTA STATE DAIRY ASSOCIATION,** to be held at Howard Johnson's, Sioux Falls, SD. For more information contact: Shirley W. Seas, South Dakota State Dairy Association, University Dairy Building, Brookings, SD 57007. 605-688-5420.

**September 17-18, MINNESOTA SANITARIANS ASSOCIATION ANNUAL MEETING,** to be held at the Earle Brown Center, Univ. of Minnesota, St. Paul Campus. For more information contact: Roy E. Ginn, Dairy Quality Control Inst., 2353 N. Rice St., Room 110, St. Paul, MN 55113. 612-484-7269.

**September 21-23, NEW YORK STATE ASSOCIATION OF MILK & FOOD SANITARIANS ANNUAL MEETING,** to be held at the Sheraton Inn Syracuse, (Liverpool, NY). For more information contact: Paul J. Dersam. 716-937-3432.

**September 30-October 2, KANSAS ASSOCIATION OF SANITARIANS ANNUAL MEETING,** to be held at the Holidome in Lawrence, Kansas. For more information contact: John M. Davis. 316-268-8351.

## *The GAFES First Ever Annual Meeting*

The Georgia Association of Food and Environmental Sanitarians held its first ever annual meeting on February 6, 1987 at Chick-fil-A headquarters in Atlanta, Georgia. Sixty-eight persons attended the meeting which included a symposium on Listeria. The 'GAFES' organization plans to become affiliated with IAMFES by the summer of 1987 pending approval by the IAMFES executive board.

A business meeting was also held where the constitution and by-laws were accepted and ratified and the executive officers were elected. These officers were elected as follows: Stanley Skelskie, President; Dr. John Green, Vice-President; Dr. Robert Brackett, Secretary; Dr. Paul Venugopal, Treasurer. A variety of executive committee assignments were also made during this time. Presently, the organization consists of 82 members, a remarkable achievement for a charter organization.

The executive committee members met on April 10 in Atlanta to discuss the policies and direction of GAFES. A symposium on Salmonella in the Poultry Industry is being planned tentatively for early Fall of 1987. Stan Skelskie indicated during this meeting that he was pleased to see so many enthusiastic members who are eager to participate in the organization.

## *Report on 1987 Annual FAMFES Educational Conference*

The Florida Association of Milk, Food and Environmental Sanitarians held its Annual Educational Conference April 7 & 8, 1987 at the Gainesville Hilton in Gainesville, Florida. There were about 80 members and friends attending the two days of sessions, the business meeting and banquet. The Registration area contained the International Display provided by Kathy Hathaway and Kate Wachtel from the IAMFES office and two Industry exhibits; a 3M exhibit of Petrifilm Plates and an exhibit by Control Instrument Systems Inc.

The educational and scientific program was approved by the University of Florida for Continuing Education Units (CEUs). The sessions included discussions on Irradiated Foods; Sulfites in Foods; New Information on Diet and Health - Fat, Cholesterol and Your Heart; Listeria; Methods of Investigating Foodborne Illness; Food Service Sanitation - The Dilema of Cultural Barriers; a panel discussion on Industry, Public Health and Consumer Concerns about Milk Product Quality including papers on What is being Done to Improve the Quality of Local Milk Supplies; the Quality of Out-Of-State Milk Supplies; What Are Regulatory Agencies Doing to Improve Milk quality For The Consumer; and Milk Product Quality As Received by the Consumer - A Finished Product Survey. Other papers covered New Calcium Fortified Foods; Handling Hazardous Chemicals in Food Plants and Laboratories; Pretreatment of Food Plant Waste; Vending Bottled Water; and a general talk, Promote or Perish, by Dr. C. Bronson Lane.

During the Banquet the FAMFES Scholarship Award Winner - Ms. Deborah M. Molnar, a Junior in the Food Science Department of the University, was introduced. She has maintained a 3.66 grade point average at the University and is interested in a career in the Dairy Industry with emphasis on Quality Control. Kathy Hathaway presented the IAMFES Certificate of Merit to Dr. Ronald Schmidt, our new President-Elect and a professor at the University of Florida's Food Science and Human Nutrition Department.

At the Business Meeting the 1987-88 President-Elect and Board of Directors were elected. The new Officers and Directors of FAMFES are: Past President - R. F. (Dick) Jolley, Bradenton; President - Dr. Oliver W. Kaufmann, Bradenton; President-Elect - Dr. Ronald H. Schmidt; Secretary/Treasurer - Dr. Franklin W. Barber, New Smyrna Beach; Directors: Marian Ryan, Winter Haven; Jeanie Cromartie, Gainesville; Deborah Portuese, Orange City; Kenneth Crothers, Tampa; and Kevin Quinn, Lakeland. FAMFES Affiliate Representative to Affiliate Council - Dr. Ronald H. Schmidt, Gainesville.

FAMFES is pleased to be the Sponsoring Affiliate for the IAMFES Annual Meeting which will be held in Tampa, Florida, July 31 - August 3, 1988. More details later.

Once again the membership of FAMFES was provided an exceptional Educational Conference for 1987.

*1987-88 FAMFES officers and board: R. J. Jolley, Past Pres.; Dr. Franklin Barber, Sec/Treas.; Deborah Portuese, Dir.; Dr. Oliver Kaufmann, Pres., Marian Ryan, Dir.; and Kevin Quinn, Dir. Absent: Pres. Elect, Dr. Ronald Schmidt; Kenneth Crothers, Dir.; and Heanie Cromartie, Dir.*

*Kathy Hathaway, IAMFES presenting Dr. Ronald H. Schmidt IAMFES Certificate of Merit.*

*Dr. Ronald Schmidt presenting FAMFES Scholarship Award winner Ms. Deborah Molnar.*

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**Packaged Ice: A Growing Food Protection Problem,** *Charles W. Felix, MPH, Charles Felix Associates,* P.O. Box 1581, Leesburg, VA 22075.

A food safety problem that has surfaced in the past 10 years with the extraordinary growth of food service in convenience stores is the contamination of ice made, served, an sold on the premises. In the back rooms of countless gas stations, package stores, and convenience outlets in the U.S., ice making machines account for an ice industry of considerable magnitude that is generally unregulated and frequently unsanitary. A survey of the 50 States indicates that health officials often either do not inspect these ice making operations or, being unfamiliar with the critical control points in ice manufacture, neglect to check on the sanitary quality of the ice made, served and/or packaged, and sold on the premises. A search of the literature reveals that ice is indeed a food and capable of supporting the survival and growth of pathogenic organisms. There is also documented evidence that contaminated ice can cause illness in consumers. A model code for packaged ice has been developed by the Packaged Ice Association for the instruction of inspectors and operators alike. These guidelines are presented in the context of the health hazards represented by unregulated packaged ice.

**Improved Selective Plating Medium for Detection of Salmonellae from Fresh and Cured Poultry Samples,** *J. S. Bailey*, J. Y. Chiu, N. A. Cox, and R. W. Johnston,* USDA, Agricultural Research Service, RRC, P.O. Box 5677, Athens, GA 30613.

A new modified lysine iron agar medium (MLIA/USDA) and developed and evluated against brilliant green sulfa agar (BGS) and xylose lysine desoxycholate agar with novobiocin (XLDN) for the selective differentiation of salmonellae from fresh and cured poultry. Fifty samples of mechanically deboned turkey, mechanically deboned cured chicken meat, and rinse samples of fresh chicken carcasses were either direct enriched in selenite cystine broth at 35°C or preenriched in lactose broth with 0.6% tergitol at 35°C and then enriched in TT broth at 43°C or selenite brilliant green at 43°C. Overall, significantly ($P = .05$) more salmonellae were recovered with MLIA/USDA than with BGS or XLDN. When the poultry products were enriched in TT broth at 43°C and then streaked onto MLIA/USDA plates, 75% of isolates from cured meat and 95% of isolates from turkey and fresh chicken were confirmed to be salmonellae. By using the TT (43)-MLIA/USDA procedure, fewer isolates would have to be picked from the selective plates to ensure confirmation of salmonellae. The medium can be stored for at least 3 weeks at 4°C without loss of selective differential properties.

**Field Evaluation of a Modified Farm Inspection Program,** **Randall Daggs, Manager, Wisconsin Grade A Milk Certification Program,* Wisconsin Division of Health, Bureau of Environmental Health, P.O. Box 309, 1 W. Wilson, Madison, WI 53701.

There has been considerable interest, both recent and past, as to whether 2 inspections per year are needed on all Grade "A" farms. More efficient use of resources might be obtained in a "modified inspection" program whereby only one inspection a year would be made on a farm demonstrating satisfactory sanitation and quality. Farms less than desirable would be inspected as often as necessary to maintain minimum Grade A standards. Such a modified program was implemented in 1984, involving over 400 Grade A farms in a specific geographic region. A field sanitation survey was conducted at the start of the program, then again 2 years later on the same farms. The sanitation compliance rating (SCR) dropped significantly in that time frame (6.3 points) seemingly independent of farm size, general management practices, and quality. The study supports the present program of at least 2 inspections per year per farm in order to insure consistent and satisfactory farm sanitation levels.

**Survival of *Listeria monocytogenes* During the Ripening of Colby Cheese,** *Ahmed E. Yousef* and Elmer H. Marth,* Department of Food Science and the Food Research Institute, University of Wisconsin, Madison, WI 53706.

Colby cheese was made from pasteurized whole milk inoculated with *Listeria monocytogenes* (stain V7 or California). The number of *L. monocytogenes* was monitored during manufacture and ripening of the cheese. Ten-g samples of curd or cheese were mixed with 90 ml of warm (40°C) 2% citrate solution and blended for 2 min. One-tenth ml of the emulsified sample (or its 1:10 dilution) was spread on McBride Listeria Agar. Plates were incubated 48 h at 35°C in an atmosphere of 5% $O_2$: 10% $CO_2$: 85% $N_2$. Colonies of *L. monocytogenes* were counted and selected colonies wre confirmed biochemically. At the time of hooping, curd contained ca. 10 times the number of *L. monocytogenes* that was in inoculated milk. Most *Listeria* cells were in curd and only a few in whey. Batches of cheese that contained strain V7 were ripened for 4 months at ca. 4°C. Numbers of *Listeria* in these cheeses remained almost constant for 1 month, then gradually decreased. Survival of the California strain in cheese was similar except numbers of this strain decreased more rapidly than those of V7.

**Improving the Efficiency of the BOT-ELISA Test,** *C. N. Huhtanen*,* Eastern Regional Research Center, 600 East Mermaid Lan¢, Philadelphia, PA 19118.

The enzyme-linked immunosorbent assay for *Clostridium botulinum* toxin (BOT-ELISA) is generally done at 37°C for periods of 90 min for each step. This requires a full working day excluding the first step of coating the micro-titer plates which is done at 4°C for 18 hr or more. The purpose of the research reported here was to determine if the assay could be improved by increasing the incubation temperature of the various steps. Observations were also made on the effect of microtiter plate washing methods and plate source on the efficiency of the BOT-ELISA test. The results indicated that in general the reaction times were substantially decreased by incubating at 45°C. There was a decrease in optical density at 55°C, indicating that this temperature either destroyed the toxin or exceeded the optimum for the alkaline phosphatase used in the test. No differences in sensitivity were observed among plates obtained from three different sources. Evaluation of washing methods indicated that these weashes instead of five were adequate.

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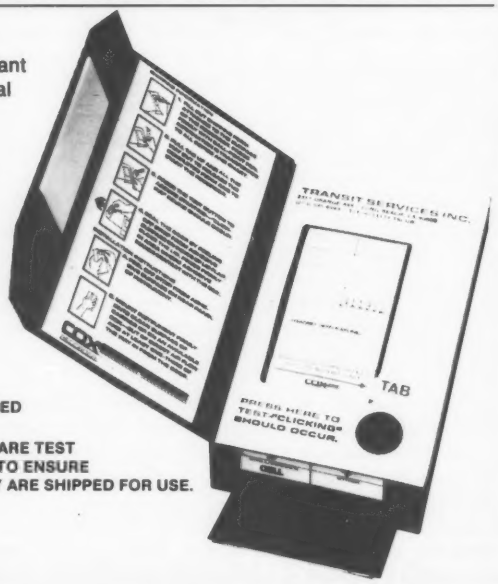


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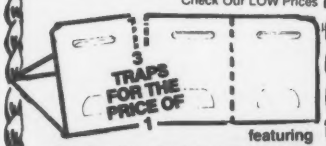


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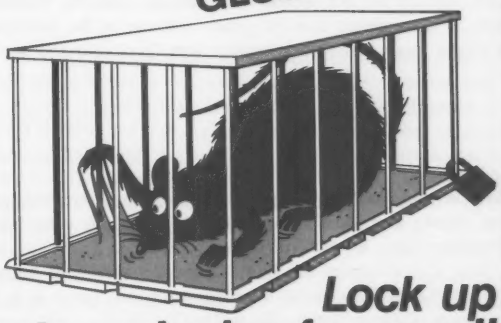

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*Abstracts of papers in the July* Journal of Food Protection

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**Thermal Resistance of *Listeria monocytogenes* in Dairy Products,** J. G. Bradshaw, J. T. Peeler, J. J. Corwin, J. M. Hunt and R. M. Twedt, Division of Microbiology, Food and Drug Administration, 1090 Tusculum Avenue, Cincinnati, Ohio 45226

*J. Food Prot.* 50:543-544

The thermal resistance of *Listeria monocytogenes* strain Scott A that had been associated with a recent milkborne outbreak of listeriosis was determined in whole and skim milk, heavy cream, and ice cream mix. *L. monocytogenes* suspended at concentrations of approximately $1 \times 10^5$ cells/ml was heated at temperatures ranging from 52.2 to 79.4°C at various contact times. The $D_{71.7°C}$ values computed for milk samples ranged from 0.9 to 2.7 s. The $D_{79.4°C}$ value in ice cream mix was 0.5 s. The $z_D$ value for fluid products ranged from 5.8 to 7.1°C; the $z_F$ value for ice cream mix was 7.0°C. The *L. monocytogenes* suspensions would not survive a proper pasteurization process given to raw dairy products.

**Seasonal Variation in the Fecal Coliform Population of Louisiana Oysters and its Relationship to Microbiological Quality,** Diane Paille, Cameron Hackney, Lawrence Reily, Mary Cole and Marilyn Kilgen, Department of Food Science, Louisiana Agricultural Experiment Station, Louisiana State University Agricultural Center, Baton Route, louisiana 70803

*J. Food Prot.* 50:545-549

Seasonal variation was observed in the type of bacteria which comprised the fecal coliform population of oysters. *Escherichia coli* was the principal fecal coliform when water temperatures were below 22°C. Conversely, *Klebsiella* sp. predominated during the summer months. No significant relationship was observed between levels of *E. coli* and enterococci and non-*E. coli* fecal coliforms in oysters. Fecal coliform and *E. coli* levels were significantly ($p > 0.001$) related in water. *Klebsiella* sp. isolated from oysters demonstrated considerably less multiple antimicrobial agent resistance than clinical isolates of *K. pneumoniae*. Fecal coliform-positive *Klebsiella* species had characteristics of environmental organisms. Results of this study suggest that high levels of non-*E. coli* fecal coliforms in oysters harvested in the summer from beds meeting the fecal coliform water standard are not indicative of sewage pollution. Furthermore, it is suggested that the safety indicator in the guideline for oyster meats should be changed form fecal coliforms to *E. coli*.

**Physical and Sensory Characteristics of Vacuum Packaged Beef Steaks and Roasts Treated with an Edible Acetylated Monoglyceride,** D. B. Griffin, J. T. Keeton, J. W. Savell, R. Leu, C. Vanderzant and H. R. Cross, Department of Animal Science, Texas Agricultural Experiment Station, Texas A & M University, College Station, Texas 77843

*J. Food Prot.* 50:550-553

Vacuum packaged strip loins and top rounds were fabricated into loin steaks and round roasts and treated, respectively, with 3 and 2% Dermatex® Food Grade (DFG), an acetylated monoglyceride. Samples were then vacuum packaged and stored at 2 ± 2°C for up to 49 (steaks) and 56 (roasts) d. Mean lean color (vacuum packaged and oxygenated), surface discoloration and overall appearance scores were not consistently different between treated and control steaks and roasts regardless of storage time. No consistent differences were observed in pH values of the lean and purge, percentage moisture or sensory evaluations of steaks and roasts treated with DFG before storage.

**Microflora of Vacuum Packaged Beef Steaks and Roasts Treated with an Edible Acetylated Monoglyceride,** R. Leu, J. T. Keeton, D. B. Griffin, J. W. Savell and C. Vanderzant, Department of Animal Science, Texas Agricultural Experiment Station, Texas A & M University, College Station, Texas 77843

*J. Food Prot.* 50:554-556

Steaks and roasts were fabricated from strip loins and top rounds that were held vacuum packaged for 10 d at 2°C. Steaks and roasts then were treated with 2-3% Dermatex® Food Grade (DFG), an acetylated monoglyceride, vacuum packaged and stored at 2 ± 2°C for up to 4 weeks (steaks) and 7 weeks (roasts). Aerobic plate counts (APC) and APT counts of control and DFG-treated steaks and roasts did not differ ($P > 0.05$) during refrigerated storage. The microflora of steaks and roasts during storage was dominated by lactic acid bacteria. Treatment with DFG did not influence the microbiological characteristics of the steaks and roasts.

**Microbiology of Mechanically Recovered Meat,** Fiona L. Krautil and John D. Tulloch, Attwood Veterinary Research Laboratory, Mickleham Road, Westmeadows, Victoria 3047, Australia

*J. Food Prot.* 50:557-561

The microbiological quality of Mechanically Recovered Meat (MRM) produced in 11 machines at eight meat plants was investigated. Aerobic Plate Counts (APC) were incubated at 35°C for 3 d, 21°C for 5 d and 4°C for 7 d. The number of samples contaminated with *Salmonella* was also determined. Overall, 85% of MRM had acceptable 35°C APCs of less than $10^6$ CFU/g, but 30% of MRM had 21°C APCs greater than $10^6$ CFU/g. The latter samples represented 47% of MRM lots, indicating that a significant amount of MRM produced during this survey would be expected to have a limited shelf life. *Salmonella* contamination was much higher in MRM than reported in other raw meat and meat products, with 39% of samples contaminated with 13 serovars. Quality of MRM varied between plants, with only three plants able to consistently produce good quality MRM. The best product was produced at plants which boned out on the premises, held bones at less than 10°C, and processed them within 8 h.

**Evaluation of an Automated Beef Carcass Washing and Sanitizing System under Production Conditions,** Maynard E. Anderson, Harold E. Huff, Hugh D. Naumann, Robert T. Marshall, John M. Damare, Mark Pratt and Ralph Johnston, United States Department of Agricultural Research Service, Room 105, Eckles Hall, University of Columbia, Missouri 65221 and Department of Food Science and Nutrition, University of Missouri-Columbia, Columbia, Missouri 65211

*J. Food Prot.* 50:562-566

Beef half carcasses were hand- or machine-washed and then machine-sanitized with 1.5% acetic acid. Sanitizer was applied at 14.4 or 52°C. Counts of *Escherichia coli, Enterobacteriaceae* and aerobic bacteria, made on samples collected by excision of tissues before and after treatments, demonstrated that machine washing and sanitizing reduced counts more than did hand washing. Counts were reduced more by hot than cool acetic acid. Percentages of samples with counts of $\log_{10}$ 5.0/200 $cm^2$ or higher after treatment were 26 and 46 for samples from carcasses sanitized with 1.5% acetic acid at 52 and 14.4°C, respectively. After hand washings 65% of the samples had these high counts.

**Efficacy of Sanitizers Using Unsoiled Spiral-Wound Polysulfone Ultrafiltration Membranes,** Karen E. Smith and R. L. Bradley, Jr., Department of Food Science, University of Wisconsin-Madison, Madison, Wisconsin 53706

*J. Food Prot.* 50:567-572

Sanitizing ultrafiltration and reverse osmosis systems poses unique problems for the dairy industry. Ultrafiltration and reverse osmosis membranes must be held wet and microorganisms remaining within the system could multiply under these conditions unless the holding solution is sufficiently microstatic. Two polysulfone ultrafiltration membranes as obtained from the manufacturer were used to evaluate cleaners and sanitizers. Because these membranes had not been used for processing there were no soil removal problems to interfere with sanitization. The ultrafiltration system was sanitized by recycling solutions for 10 min, and the unit containing sanitizer left idle 16 h. Stainless steel surfaces were examined by swabbing the next morning to check hygiene. Antibac B (50 ppm available chlorine), $H_2O_2$ (0.2%, v/v) and an acid anionic surfactant (pH 2.5) were evaluated as sanitizers. None proved satisfactory based on microbiological criteria. Also, there was a loss in available chlorine from Antibac B solutions when held overnight in the retentate housing. These same problems were evident when sanitizers were circulated after cleaning solutions. Permeate flux, when used as a criterion for system cleanliness, indicated adequate cleaning and sanitization. Inability to contact all areas of membranes may be a problem in satisfactory sanitization of an ultrafiltration system.

**Subacute Study of Rats Fed Ground Beef Treated with Aqueous Chlorine — Anatomic Pathology,** A. W. Kotula, B. S. Emswiler-Rose and D. V. Cramer, Meat Science Research Laboratory, U.S. Department of Agriculture, Agricultural Research Service, Building 201, BARC-East, Beltsville, Maryland 20705; Microbiology Division, Food Safety and Inspection Service, U.S. Department of Agriculture, Building 322, BARC-East, Beltsville, Maryland 20705 and Department of Pathology, University of Pittsburg School of Medicine, Pittsburg, Pennsylvania 15261

*J. Food Prot.* 50:573-577

This research evaluated the anatomic pathology of rats fed diets containing ground beef which had been treated with aqueous chlorine. The anatomic pathology of 240 rats fed 92 d with diets containing ground beef treated with 0, 50, 200 or 600 ppm chlorine was carried out according to National Institutes of Health bioassay pathology procedures. The major rat tissues were evaluated and the incidence of histopathological conditions was recorded. The inclusion of chlorine-treated meat in the diet was not associated with any increase in incidence of neoplastic lesions, inflammatory lesions or degenerative changes. However, all male rats fed the meat diet both with or without chlorine exhibited mild to moderate hepatic fatty metamorphosis. In all likelihood, the fatty livers were due to the high fat content of the diet (about 35%). The adrenal glands of the control and treated males exhibited fatty metamorphosis. This effect is not explained by diet because even the male rats on the commercial rat feed had fatty adrenal glands. Other histopathologic conditions such as focal hepatitis, triaditis, focal myocarditis, focal lymphocytic infiltration, chronic murine pneumonia, chronic tracheitis, focal acute gastritis, dacryoadenitis, cataract, hyperplastic hepatic nodule or ultimobranchial cysts, when found were not associated with any treatment or sex group. The treatment of ground beef with aqueous chlorine before incorporation into a diet fed rats for 92 d exhibited no apparent effect on the anatomic pathology of rats.

**Incidence of Yersinia Species in Meat Samples Purchased in Rio de Janeiro, Brazil,** marcia Barbosa Warnken, Marly Paiva Nunes and Alba Lúcia Solino Noleto, Instituto de Microbiologia, Universidade Federal do Rio de Janeiro, Bloco 1, Ilha da Cidade Universitaria, C.P. 68040, CEP 21941, Rio de Janeiro, RJ-Brazil

*J. Food Prot.* 50:578-579

Twenty-five samples of several types of meat purchased at supermarkets in Rio de Janeiro were analyzed for presence of *Yersinia*. Species were isolated from 80% of beef and chicken giblets, 60% of ground beef and beef liver and 20% of pork. Fifteen strains were identified as *Yersinia intermedia*, 9 as *Yersinia enterocolitica*, 4 as *Yersinia kristensenii* and 1 as *Yersinia frederiksenii*. Two strains of *Y. intermedia*, serotype 0:13,7 were positive in both the autoagglutination and calcium-dependency tests. Two strains of atypical *Y. intermedia* (serotype 0:29 and one not typable) and one strain of atypical *Y. enterocolitica*, serotype 0:16; were positive only in the autoagglutination test. Seventeen strains isolated from meat produced heat stable enterotoxin.

**Occurrence of *Yersinia* Species in Raw and Pasteurized Milk in Rio de Janeiro, Brazil,** Anita Tibana, Marcia Barbosa Warnken, Marly Paiva Nunes, Ilvan Delgado Ricciardi and Alba Lúcia Solino Noleto, Instituto de Microbiologia, Universidade Federal do Rio de janeiro, Bloco 1, Ilha da Cidade Universitaria, C.P. 68040, CEP 21941, Rio de Janeiro, RJ-Brazil

*J. Food Prot.* 50:580-583

Thirty-seven (16.9%) of 219 raw milk samples and 38 (13.7%) of 280 pasteurized milk samples were positive for *Yersinia* sp. The isolates from raw milk samples include *Yersinia enterocolitica* (32.4%) comprising biotype 1 (0:5, 10.8%), and biotype 2 (0:10 K1, 1.6%); *Yersinia intermedia* (64.9%) comprising 0:18 (40.5%), 0:7,8 (8.1%), 0:16 (2,7%) and non-typable (13.5%) and *Yersinia frederiksenii* (0:22, 2.7%). The isolates from pasteurized milk samples include *Y. enterocolitica* (41.5%) comprising 0:5 (31.7%), 0:13 (2.4%), 0:7,8 (2.4%) and 0:16 (4.8%); *Y. frederiksenii* (56.1%) comprising 0:27 (7.3%), 0:25,35 (12.2%), non-typable (36.6%) and *Y. intermedia* (non-typable, 2.4%). Most *Y. enterocolitica* and about one third of non-*Y. enterocolitica* strains produce heat-stable toxin (ST). Antibiotic susceptibility, autoagglutination capacity and calcium-dependency of strains also were investigated.

**Transfer Volume-Dependent Recovery of *Salmonella* from Minced Meat,** S. Kafel and E. Pogorzelska, Agro-Technical Academy, Faculty of Veterinary Medicine, 10-957 Olsztyn-Kortowo, and Insitute of Food and Nutrition, Powsinska 61/63, 03-903 Warsaw, Poland

*J. Food Prot.* 50:584-586

Six hundred 25-g samples of ground beef were divided into 3 groups of 200 each and 1 drop of a *Salmonella* broth culture was added to each sample. After storage at –27°C for 3-4 months, the samples were defrosted and blended with 225 ml of buffered peptone water. Ten ml of each suspension was preenriched at 37°C for 20 h and 10-fold dilutions of the material were made. One ml each of the preenriched culture and dilutions of $10^{-2}$, $10^{-4}$, $10^{-6}$, and $10^{-8}$ were transferred to selective enrichment media, and subsequently streaked onto selective agar plates. The mean percentage of *Salmonella*-positives obtained from all combinations of the selective media in relation to undiluted preenriched material and its $10^{-2}$, $10^{-4}$, $10^{-6}$, and $10^{-8}$ dilutions were for *Salmonella typhimurium* 70, 81, 84, 37, and 2, for *Salmonella choleraesuis* 64, 78, 66, 30, and 2, and for *Salmonella anatum* 60, 84, 75, 40, and 1, respectively. Colonies originating from diluted samples, particularly $10^{-4}$ and further dilutions, usually represented pure cultures of salmonellae, but from undiluted material were frequently accompanied or outgrown by concomitant bacteria.

**Effect of Acid Pretreatment on the Stability of EDTA, Cysteine, Lactic and Succinic Acid Complexes of Various Iron Sources in a Wheat Flake Cereal,** D. B. Nadeau and F. M.Clydesdale, Department of Food Science and Nutrition, Massachusetts Agricultural Experiment Station, University of Massachusetts, Amherst, Massachusetts 01003

*J. Food Prot.* 50:587-597

An in vitro incubation at pH 2 of EDTA, cysteine, lactic or succinic acids with each of five iron sources, [hydrogen (HRI) and electrolytically reduced elemental iron (ERI), ferric chloride ($FeCl_3$), ferrous sulfate ($FeSO_4$) and ferric orthophosphate (FOP)] at a 10:1 molar ratio (ligand:iron) was evaluated for its effect on iron solubilization in a wheat flake cereal subjected to a sequential gastrointestinal pH treatment from endogenous pH (E) to 2 to 6. Incubation significantly enhanced the iron solubilizing potential of EDTA at each pH with HRI and ERI, while lactic and succinic acids were similarly effective with $FeSO_4$ and $FeCl_3$ at pH 2. The reducing potential of cysteine, along with its role as a ligand, generated substantial amounts of $Fe^{+2}$ (pH 2) at the apparent expense of complexed iron. However, with the exception of ERI (pH 2), incubation did not increase cysteine's effectiveness in producing more soluble iron (ionic + complexed). This indicates that pH was the major solubilizing factor. Due to FOP's relative insolubility, incubation proved ineffective in all instances. These in vitro results indicate that acid incubation to form a ligand-iron complex has the potential to improve bioavailability of iron.

**Effects of VariousAcids on Growth and Survival of *Yersinia enterocolitica*,** Robert E. Brackett, Department of Food Science and Technology, University of Georgia, Experiment, Georgia 30212

*J. Food Prot.* 50:598-601

The relative effects of several different acids on survival of *Yersinia enterocolitica* in tryptic soy broth after 24 h of incubation were compared. The acids compared included 25, 50, 75, and 100 m*M* concentrations of hydrochloric (HCl), citric (CIT), acetic (ACE), lactic (LAC), propionic (PRO), or phosphoric (PHO) acid. The decrease in viable *Yersinia* cells was compared based on concentration of acid added, pH, and the calculated concentration of the undissociated portion of the monoprotic acids. In addition, data were subjected to analysis of variance procedures to determine significant differences among the antimicrobial activities of the various acids. Results indicated that the relative activity of the acids differed depending on how the data were compared. When based on equal molar concentration of acid added, the overall hierarchy of antimicrobial activity appeared to be CIT $\geq$ HCl $\geq$ LAC $\geq$ PHO $>$ PRO $\geq$ ACE. The antimicrobial activity based on pH gave the apparent overall hierarchy PRO $\geq$ LAC $\geq$ ACE $>$ CIT $\geq$ PHO $\geq$ HCl. The antimicrobial activity based on the concentration of the undissociated portion of monoprotic acids appeared to be HCl $>$ LAC $>$ PRO $\geq$ ACE. Although graphic representation of the data gave the appearance of differences in antimicrobial effects, statistical analysis revealed that often there was no significant difference ($p \leq 0.05$) between acids. Differences which did appear were concentration-dependent. Statistical analysis also revealed that pH alone did not have a significant effect on survival.

**Effect of Brining and Canning on Salt Uptake and Retention by Herring (*Clupea harengus*) Examined Using Four Analytical Methods,** Bohdan M. Slabyj, Tom Maloy, William P. Cook and Jeffrey A. Risser, Department of Food Science and Department of Plant and Soil Sciences, University of Maine, Orono, Maine 04469 and Office of Special Programs, University of Maine at machias, Machias, Maine 04654

*J. Food Prot.* 50:602-607

The effect of brine concentration, brine temperature, brining period, delayed brining and fish size on salt uptake by sea herring *(Clupea harengus)* as well as salt retention after subsequent steaming and retorting in oil was examined. Salt was determined using four different analytical precedures (QUANTAB, specific ion electrode, inductively coupled plasma spectrometer, and potentiometer). Results revealed that all four methods are reliable and comparable. While no significant differences were detected using the four analytical methods on raw fish, similar differences among canned samples were observed to be statistically different among three analytical methods (QUANTAB, specific ion electrode, and inductively coupled plasma spectrometer). Rate of salt uptake at 10°C was statistically different (higher) from brining at 0°C, but the difference in salt uptake by the herring was exceedingly small. Delayed salting appeared not to have an effect on salt uptake. Herring size, brine concentration, and brining period all had a strong influence on salt content of the treated fish. Steaming and retorting tended to remove about 24% of the salt that was initially absorbed during brining.

**Calculating $F_T$-Values for Heat Preservation of Shelf Stable, Low-Acid Canned Foods using the Straight-Line Semilogarithmic Model,** I. J. Pflug, Department of Food Science and Nutrition, University of Minnesota, 1334 Eckles Avenue, St. Paul, Minnesota 55108

*J. Food Prot.* 50:608-615

This is a review paper illustrating how the heat process $F_T$-value for low-acid canned foods can be estimated using measured values of the numbers and resistance of the spoilage organisms and an appropriate model. Heat process $F_T$-values are calculated using the straight-line semilogarithmic model for preservation against public heatlh, mesophilic spore economic and thermophilic spore economic spoilage. The microbiological characteristics of each type of preservation hazard are reviewed. Several appropriate values of $D_T$ and $N_0$ are used in the illustration calculations of $F_T$. The presentation is summarized graphically by placing the $F_T$-value lines calculated using the model for preservation against public health, mesophilic spore and thermophilic spore hazards all on the same graph. This gives a visual picture of the relative magnitude of the $F_T$-value for the different types of spoilage hazard.

**Antibiotic Use for Growth Promotion in Animals: Ecologic and Public Health Consequences,** Stuart B. Levy, Departments of Molecular Biology and Microbiology and of Medicine, Tufts University School of Medicine, Boston, Massachusetts 02111

*J. Food Prot.* 50:616-620

Antibiotics have successfully treated infectious diseases in man, animals and agricultural plants. However, one consequence of usage at any level, subtherapeutic or therapeutic, has been selection of microorganisms resistant to these valuable agents. Today clinicians worldwide face singly resistant and multiply resistant bacteria which complicate treatment of even common infectious agents. This situation calls for a critical evaluation of the numerous ways in which antibiotics are being used so as to evaluate benefits and risks. About half of the antibiotics produced in the United States are used in animals, chiefly in subtherapeutic amounts for growth promotion. This usage is for prolonged periods leading to selection of multiply-resistant bacteria which enter a common environmental pool. From there, resistance determinants from different sources spread from one bacterium to another, from one animal host to another, from one area to another. The same resistance determinants have been traced to many different genera associated with humans, animals and foods where they pose a continued threat to public health. Since alternative measures for growth promotion, such as antimicrobials which are not used for human therapy and which do not select for multiple-resistances are available, their use, instead of antibiotics, would remove a major factor contributing to the environmental pool of transferable resistance genes.

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## Calendar

### 1987

**July 10-18, SEVENTH INTERNATIONAL WORKSHOP ON RAPID METHODS AND AUTOMATION IN MICROBIOLOGY,** to be held at Kansas State University, Manhattan, KS. For more information, contact: Dr. Daniel Y.C. Fung, Director of the workshop. 913-532-5654.

**July 14-16, BASIC PASTEURIZATION COURSE,** to be held in San Antonio, TX. Location to be announced. For more information, contact: Ms. Janie F. Park, TAMFES, P.O. Box 2363, Cedar Park, Texas 78613-2363. 512-458-7281.

**July 27-29, QUALITY CONTROL SEMINAR,** to be held at the Holiday Inn Holidome in Manhattan, KS. For more information, contact: The Registrar, American Institute of Baking, 1213 Bakers Way, Manhattan, KS 55402.

**July 27-30, LIQUITEC EXPO '87 TECHNICAL WORKSHOPS AND EDUCATIONAL SEMINARS,** to be held at the Philadelphia Civic Center. For more information, contact: Liquitec Expo '87, Box 630, West Paterson, NJ 07424. 201-256-0011.

**August 2-4, WEST VIRGINIA DAIRY PRODUCTS ASSOCIATION ANNUAL MEETING (75TH ANNIVERSARY),** to be held at the Greenbrier, White Sulphur Springs, WV. For more information contact: Paul M. Smith, Room 1054 Ag. Sci. Bldg., Box 6108, Morgantown, WV 26506-6108.

**August 2-6, IAMFES 74TH ANNUAL MEETING,** to be held at the Disneyland Hotel, Anaheim, California. For more information, contact Kathy R. Hathaway, IAMFES, Inc., PO Box 701, Ames, IA 50010. 800-525-5223, in Iowa 515-232-6699.

**August 2-7, CALIFORNIA ASSOCIATION OF DAIRY AND MILK SANITARIANS BUSINESS MEETING,** to be held at the Disneyland Hotel in Anaheim, CA. For more information, contact: Richard Harrell at 213-757-9719 or Austin Olinger at 818-968-9621.

**August 5-7, IOWA DAIRY FOODS ASSOCIATION ANNUAL CONVENTION,** to be held at the Village West, Lake Okoboji, IA. For more information, contact: John R. Brockway, 1805 74th Street, Des Moines, IA 50322.

**August 9-14, ANNUAL MEETING OF THE SOCIETY FOR INDUSTRIAL MICROBIOLOGY,** to be held at The Hyatt Regency Hotel, Baltimore, Maryland. For more information, contact: Mrs. Ann Kulback, SIM, P.O. Box 12534, Arlington, VA 22209. 703-941-5373.

**August 16-18, WISCONSIN DAIRY PRODUCTS ASSOCIATION, INC. JOINT ANNUAL MEETING & CONVENTION WITH MIDWEST DAIRY PRODUCTS ASSOCIATION, INC.,** to be held at The Abbey on Lake Geneva, Fontana, WI. For more information, contact: Norm E. Kirschbaum, 1400 E. Washington Ave., Suite 185, Madison, WI 53703.

**August 16-18, MICHIGAN DAIRY FOODS ASSOCIATION ANNUAL CONVENTION,** to be held at Boyne Highlands Resort, Harbor Springs, MI. For more information, contact: Frank Koval, 748 N. Cedar St., Lansing, MI 48906.

**August 17-21, BIOTECHNOLOGY: MICROBIAL PRINCIPLES AND PROCESSES FOR FUELS, CHEMICAL AND BIOLOGICALS,** to be held at the Massachusetts Institute of Technology, Cambridge, MA. For more information, contact: Director of Summer Session, MIT, Room E19-356, Cambridge, MA 02139.

**August 31-September 4, 71ST ANNUAL SESSIONS OF THE INTERNATIONAL DAIRY FEDERATION,** to be held in Helsinki, Finland. For more information, contact: Harold Wainess, Secretary, U.S. National Committee of the IDF (USNAC, 464 Central Avenue, Northfield, IL 60093. 312-446-2402.

**September, WAMFES ANNUAL MEETING,** to be held in Eau Claire, WI. For more information, contact: Randy Daggs. 608-266-9376.

**September 1-2, FOOD PROCESSING WASTE CONFERENCE, Radisson Hotel, Atlanta, GA.** For more information, contact: Edd Valentine or Chuck Ross, Georgia Tech Research Inst., Economic Development Laboratory, Environmental, Health and Safety Division, O'Keefe Building, Atlanta, GA 30332. 404-894-3412.

**September 8-10, BASIC PASTEURIZATION COURSE,** to be held at the Viscount Hotel in Houston, Texas, 713-526-4571. For more information, contact: Ms. Janie F. Park, TAMFES, P.O. Box 2363, Cedar Park, TX 78613-2363. 512-458-7281.

**September 9-10, NEBRASKA DAIRY INDUSTRIES ASSOCIATION ANNUAL CONVENTION,** to be held at the Best Western Regency West, Omaha, NE. For more information, contact: Michael Liewen, 134 Filley Hall, University of Nebraska, Lincoln, NE 68583-0919.

**September 9-10, UNITED DAIRY INDUSTRY ASSOCIATION ANNUAL MEETING,** to be held at the Marriott O'Hare, Chicago, IL. For more information, contact: Edward A. Peterson, 6300 N. River Road, Rosemont, IL 60018.

**September 10-13, DAIRY PRODUCTS INSTITUTE OF TEXAS FALL BOARD OUTING,** to be held at Horseshoe Bay Resort, TX. For more information, contact: Glenn R. Brown, 201 Vaughn Building, Austin, TX 78701.

**September 14-15, ASSOCIATED ILLINOIS MILK, FOOD, AND ENVIRONMENTAL SANITARIANS FALL SEMINAR AND ANNUAL MEETING,** a joint conference with the Coop Extension Service, University of Illinois to be held at the Chancellor Inn, Champaign, IL. For more information contact: Dr. Clem Horner, Secretary, Gorman Publishing Co., 8750 W. Bryn Mawr, Chicago, Il 60631 (312) 693-3200 or Dr. Gary Harpestad, Extension Dairyman, University of IL., 315 Animal Sciences Lab, 1207 W. Gregory Dr., Urbana, IL 61801. (217) 333-0510.

**September 14-17, AOAC TO HOLD 101ST ANNUAL INTERNATIONAL MEETING,** to be held at The Cathedral Hill Hotel, in San Francisco. For more information, contact: the AAOAC office at 1111 N. 19th St., Suite 210, Arlington, VA 22209. 703-522-3032.

**September 14-18, FOOD MICROBIOLOGY SHORT COURSE,** sponsored by the University of California and University Extension. To be held at the Department of Food Science and Technology, Cruess Hall, UC Davis Campus. For further information, contact: Kathryn J. Boor, Food Science and Technology, University of California, Davis, CA 95616. 916-752-1478.

**September 15-16, 1987 ANNUAL CONVENTION OF THE SOUTH DAKOTA STATE DAIRY ASSOCIATION,** to be held at Howard Johnson's, Sioux Falls, SD. For more information, contact: Shirley W. Seas, South Dakota State Dairy Association, University Dairy Building, Brookings, SD 57007. 605-688-5420.

**September 17-18, WISCONSIN LABORATORY ASSOCIATION ANNUAL EDUCATION CONFERENCE,** to be held at the Holiday Inn, Fond du Lac, WI. For more information, contact: Sharon Kluender, 616 1/2 Garfield Ave., Wausau, WI 55401. 715-848-1406.

**September 17-18, MINNESOTA SANITARIANS ASSOCIATION ANNUAL MEETING,** to be held at the Earle Brown Center, Univ. of Minnesota, St. Paul Campus. For more information, contact: Roy E. Ginn, Dairy Quality Control Inst., 2353 N. Rice St., Room 110, St. Paul, MN 55113. 612-484-7269.

**September 20-23, NATIONAL DAIRY COUNCIL OF CANADA 70TH ANNUAL CONVENTION,** to be held at the Quebec Hilton, Quebec, Canada. For more inform9Q 75"1kk!1 141 Laurier Avenue West, Ottawa, Ontario Canada K1P 5J3.

**September 21-23, NEW YORK STATE ASSOCIATION OF MILK & FOOD SANITARIANS ANNUAL MEETING,** to be held at the Sheraton Inn Syracuse, (Liverpool, NY). For more information, contact: Paul J. Dersam. 716-937-3432.

**September 24-25, SWEETENERS IN FOODS: SENSORY, PROCESSING AND HEALTH ASPECTS,** to be held at Kansas State Union, Kansas State University, Manhattan, KS. For more information, contact: Dr. Carol Setser or Dr. Karen Penner, Department of Foods and Nutrition, Justin Hall, Kansas State University, Manhattan, KS. 913-532-5508.

**September 28-29, SEMINAR ON "CONTEMPORARY QUALITY ASSURANCE,"** jointly sponsored by the International Dairy Federation and USNAC. To be held in McCormick Place, Chicago, IL. For more information, contact: Harold Wainess, Secretary, U.S. National Committee of the IDF

(USNAC), 464 Central Avenue, Northfield, IL 60093. 312-446-2402.

**September 30-October 2, KANSAS ASSOCIATION OF SANITARIANS ANNUAL MEETING,** to be held at the Holidome in Lawrence, Kansas. For more information, contact: John M. Davis. 316-268-8351.

**October 5-9, 13TH INTERNATIONAL SYMPOSIUM OF THE IUMS-ICFMH & FECS-WPFC,** "Toxins in Foodborne Disease" and "Microbiology of Drinking Water," to be held in Halkidiki, Greece. For more information, contact: Prof. J. A. Papadakis, Omirou 24, 10672 Athens, Greece.

**October 12-14, BIOTECHNOLOGY PROCESSING ENGINEERING CENTER THIRD ANNUAL SYMPOSIUM,** to be held at the Massachusetts Institute of Technology, Cambridge, MA 02139. For more information, contact: Diana Kenney, MIT, Room 20A-207, Cambridge, MA 02139. 617-253-0805.

**October 18-21, CORNELL SYMPOSIUM ON CHEESE BIOTECHNOLOGY AND INTERNATIONAL FOOD DEVELOPMENT,** to be held at Cornell University, Ithaca, NY. For more information, contact: Richard A. Ledford, Chairman, Department of Food Science, Cornell University, Ithaca, NY 14853-7201. 607-255-7616.

**October 19-21, DESCRIPTIVE ANALYSIS,** to be held in Palo Alto, California. Preregistration required. For more information, contact: Herbert Stone, President, Tragon Corporation, 365 Convention Way, Redwood City, CA 94063. 415-365-1833 or Telex WUI 6502215776 (access MCI).

**November, CANADA'S AMFES ANNUAL MEETING,** to be held in Edmonton, Alberta. For more information, contact: Jim Eisen. 451-0817.

**November 8-11, DAIRY INSTITUTE OF CALIFORNIA ANNUAL FALL MEETING,** to be held at The Lodge, Pebble Beach, CA. For more information, contact: Robert D. Boynton, Suite 718, 1127 - 11th Street, Sacramento, CA 95814.

**November 10-12, BASIC PASTEURIZATION COURSE,** to be held in Texarkana, Texas. Location to be announced. For more information, contact: Ms. Janie F. Park, TAMFES, P.O. Box 2363, Cedar Park, Texas 78613-2363. 512-458-7281.

**November 15-18, SOUTHERN ASSOCIATION OF DAIRY FOOD MFRS., INC. 73RD ANNUAL CONVENTION,** to be held at Colonial Williamsburg Foundation, Williamsburg, VA. For more information, contact: John E. Johnson, P.O. Box 10506, Raleigh, NC 27605

**November 30-December 3, NATIONAL MILK PRODUCERS FEDERATION ANNUAL MEETING,** to be held at the Hyatt Regency, New Orleans, LA. For more information, contact: James C. Barr, 1840 Wilson Blvd., Arlington, VA 22201.

**November 30-December 4, THE FIRST LATIN AMERICAN CONGRESS ON FOOD MICROBIOLOGY AND THE I ARGENTINE SYMPOSIUM ON PRESERVATION OF FOODS,** to be held in Buenos Aires, Argentina. For more information, contact: Dr. Ricardo Sobol, Secretary General, Bulnes 44 P.B. "B", 1176 Buenos Aires, Argentina. Additional information: Dr. Fernando Quevedo, 525 Twenty Third St., N.W., Washington, D.C. 20037.

**December 8-11, WORKSHOP IN INSTRUMENT SERVICE AND REPAIR,** to be held at the Anderson training facility and dairy processing plant in Fultonville, NY. For more information, contact: Michael D. Cunningham, Anderson Instrument Company, Inc., R.D. 1, Fultonville, NY 12072. Telephone: 518-922-5315.

## 1988

**January 20-23, FOURTH INDUSTRY-WIDE U.S. DAIRY FORUM,** sponsored by the Milk Industry Foundation and International Ice Cream Association. To be held at the Innisbrook in Tarpon Springs, FL. For more information, contact: Joe Dugan, 888 Sixteenth Street, N.W., Washington, DC 20006. 202-296-4250; TELEX 150185.

**February 10-11, DEPARTMENT OF FOOD SCIENCE & NUTRITION DAIRY & FOOD INDUSTRY CONFERENCE,** to be held at the Fawcett Center for Tomorrow, Ohio State University, Columbus, OH. For more information, contact: John Lindamood, 2121 Fyffe Road, Columbus, OH 43210-1097.

**February 12-14, DAIRY PRODUCTS INSTITUTE OF TEXAS ANNUAL CONVENTION,** to be held at the Hershey Hotel, Corpus Christi, TX. For more information, contact: Glenn R. Brown, 201 Vaughn Building, Austin, TX 78701.

**February 21-24, SWEETENER USERS GROUP, INTERNATIONAL SWEETENER COLLOQUIUM,** to be held at Innisbrook Resort, Tarpon Springs, FL. For more information, contact: Constance E. Tipton, 888 16th Street, NW, Washington, DC 20006.

**March 6-8, OHIO DAIRY PRODUCTS ASSN., INC. ANNUAL CONVENTION,** to be held at Dayton Marriott Hotel, Dayton, OH. For more information, contact: Don Buckley, 1429 King Ave., #210, Columbus, OH 43212.

**March 13-16, DAIRY & FOOD INDUSTRIES SUPPLY ASSN. ANNUAL CONFERENCE,** to be held at Americana Canyon Resort, Palm Springs, CA. For more information, contact: Bruce D'Agostino, 6245 Executive Blvd., Rockville, MD 20852.

**March 21-25, DEPARTMENT OF FOOD SCIENCE & NUTRITION, MID-WEST WORKSHOP IN MILK & FOOD SANITATION,** to be held at Fawcett Center for Tomorrow, Ohio State University, Columbus, OH. For more information, contact: John Lindamood, 2121 Fyffe Road, Clumbus, OH 43210-1097.

**April 10-13, MILK INDUSTRY FOUNDATION, INTERNATIONAL ICE CREAM ASSOCIATION, MARKETING & TRAINING INSTITUTE SPRING BOARD MEETING,** to be held at The Ritz Carlton, Laguna Niguel, CA. For more information, contact: John F. Speer, Jr., 888 16th Street, NW, Washington, DC 20006.

**April 18-21, AMERICAN DAIRY PRODUCTS INSTITUTE ANNUAL MEETING & TECHNICAL CONFERENCE,** to be held at Chicago O'Hare Marriott Hotel, Chicago, IL. For more information, contact: Warren S. Clark, Jr. 130 N. Franklin Street, Chicago, IL 60606.

**May 22-24, GEORGIA DAIRY PRODUCTS ASSOCIATION ANNUAL CONVENTION,** to be held at Callaway Gardens, Pine Mountain, GA. For more information, contact: Pat Hamlin, P.O. Box 801, Macon, GA 31208.

**July 31-August 4, IAMFES 75th ANNUAL MEETING,** to be held at the Hyatt Regency Westshore, Tampa, FL. For more information contact Kathy R. Hathaway, IAMFES, Inc., P.O. Box 701, Ames, IA 50010. 800-525-5223, in Iowa 515-232-6699.

**September 11-13, NATIONAL DAIRY COUNCIL OF CANADA ANNUAL CONVENTION,** to be held at the Winnipeg Convention Centre, Winnipeg, Manitoba. For more information, contact: Pat MacKenzie, 141 Laurier Avenue West, Ottawa, Ontario, Canada K1P-5J3.

**September 11-14, SOUTHERN ASSOCIATION OF DAIRY FOOD MANUFACTURERS, INC. 74TH ANNUAL CONVENTION,** to be held at the Boca Raton Hotel & Club, Boca Raton, FL. For more information, contact: John E. Johnson, P.O. Box 1050, Raleigh, NC 27605.

**September 21-22, UNITED DAIRY INDUSTRY ASSOCIATION ANNUAL MEETING,** to be held at the Hyatt Regency Minneapolis, Minneapolis, MN. For more information, contact: Edward A. Peterson, 6300 N. River Road, Rosemont, IL 60018.

**October 9-13, AACC ANNUAL MEETING,** to be held at the Hotel InterContinental San Diego, in San Diego, California. For more information, contact: Raymond J. Tarleton, American Assoc. of Cereal Chemists, 3340 Pilot Knob Road, St. Paul, MN 55121. 612-454-7250.

**October 15-19, MILK INDUSTRY FOUNDATION & INTERNATIONAL ICE CREAM ASSOCIATION ANNUAL CONVENTION & SHOW,** to be held at Marriott's Orlando World Center, Orlando, FL. For more information, contact: John F. Speer, Jr., 888 16th Street, NW, Washington, DC 20006.

**November 28-December 1, NATIONAL MILK PRODUCERS FEDERATION ANNUAL MEETING,** to be held at the Hilton, Anaheim, CA. For more information, contact: James C. Barr, 1840 Wilson Blvd., Arlington, VA 22201.

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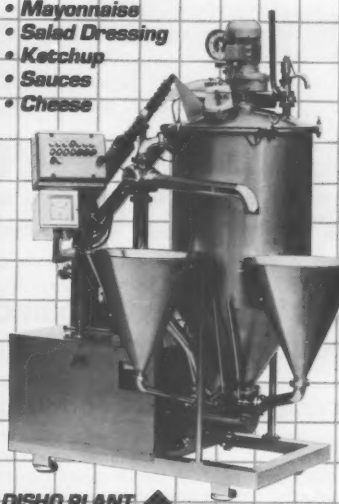

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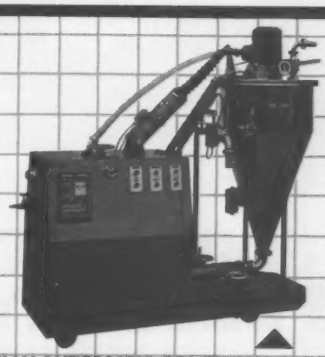

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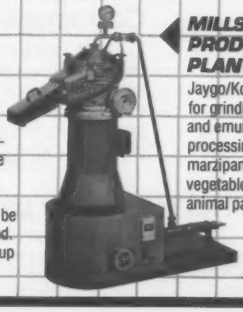

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